FACTORS ASSOCIATED WITH UTILIZATION OF IMMUNIZATION SERVICE AMONG UNDER 3 YEARS OLD CHILDREN IN URBAN SLUMS OF CHANMYATHAZI TOWNSHIP, MANDALAY, MYANMAR

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ABSTRACT

Child immunization is one of the most cost-effective public health interventions and it plays as a key role in reducing child mortality and occurrence of lifelong diseases.

This cross-sectional study was designed to identify the prevalence of immunization and factors associated with utilization of immunization service among under 3years old children in urban slums of Chanmyathazi Township, Mandalay. The outcome variables used for this study were whether the child received complete types of EPI immunization, immunization with timeliness and utilization of immunization service. Cluster sampling was applied to select 429 primary caregivers of under 3years old children. Face to face interview was conducted using structured questionnaires. Chi-square test and multiple logistic regression were used to examine associations between the selected factors and outcome variables.

In the study result, 24.1% of the children were with complete type of immunization according to national schedule and 64.8% were partial, whereas 11.1% of them were never immunized. Regarding timeliness, 26.5% of the immunized children had the timely vaccinations, while about three-fourth 73.5% of those had delayed immunization. In terms of utilization of immunization status, 23% of the caregiver utilized the service with quality immunization and 77% of them did not utilize the service. In multiple logistic regression analysis, child age (AOR: 3.49; 95%CI: 1.63-7.50), income (AOR: 6.36; 95%CI: 2.35-17.18), migration status (AOR: 3.28; 95%CI: 1.05-10.29), ANC visit (AOR: 4.77; 95%CI: 1.55-14.67), receiving additional vaccine (AOR: 6.27; 95%CI: 2.72-14.44) and having immunization card (AOR: 3.15; 95%CI: 1.33-7.46) were associated with the utilization of the immunization service (P-value<0.05).

The finding of this study suggested that not only strengthening of Effective Health Information Management Systems with a focus on slum migrants but also keeping health records in forms of electronic registration by using appropriate software which will reduce dependency of immunization card. The study also indicated that it is needed to implement comprehensive maternal and child health care system that promotes ANC together with immunization uptake and health promotion programs on additional vaccine preventable diseases such as Rotavirus infection and Japanese encephalitis in community level.

KEY WORDS: IMMUNIZATION/UTILIZATION/ SLUM/MYANMAR/UNDER 3 YEARS CHILDREN

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LIST OF ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations
VPD	vaccine preventable diseases
SIAs	Supplementary Immunization Activities
LMIC	Low and Middle-Income Countries
MOHS	Ministry of Health and Sport Myanmar
ANC	Antenatal care
BCG	Bacillus Chalmette-Guerin
MR	Measles Rubella
JE	Japanese encephalitis
Hib	Haemophilus influenza type B
OPV	Oral Polio Vaccine
IPV	Injected Polio Vaccine
UNICEF	United Nations Children's Fund
WPR	Western Pacific Region
AFP	Acute Flaccid Paralysis
SEAR	South-East Asia Region
VDPV	Vaccine Derived poliovirus
WPV	Wild Polio Virus
RUM	Rural–Urban Migrant
TT	Tetanus Toxoid
IMR	Infant Mortality Rate
KD	Kuder- Richardson
SPSS	Statistical Package for Social Science

CHAPTER I
INTRODUCTION

1.1 Rationale and Justification of the study

Diseases against that lifelong immunity can be established by administration of early age immunizations are discussed to as Vaccine preventable diseases (VPDs). Early childhood immunization acts a key role in reducing child mortality and incidence of lifelong diseases amongst the immunized populations. VPDs include most of highly transmittable and deadly diseases such as measles, tuberculosis, yellow fever, Diphtheria-Tetanus-Pertussis (DTP), hepatitis B, and Haemophilus Influenza type B. Early age vaccinations and resulting prevention of VPDs and consequently decrease the disease burden on public health infrastructure and increase the community's living standards in general. Routine childhood immunization is mentioned as one of the most cost-effective interventions public health (1).Immunization consults protection through both indirect and direct effects, mainly via the reduced spread of bacteria from one person to another (2). It is estimated that complete immunization alone can prevent between two and three million deaths each year(3). Most of the countries have not only tried to achieve 2015 the Millennium Development Goals (MDGs), but also facing an even strenuous challenge with the new Sustainable Development Goals (SDGs). One of the SDG goals comprises falling <5 child mortality to as 25 per 1000 live birth (1). It is expected that success of these health-related targets for maternal & child health would effect in a developed global average life expectancy of approximately four years by 2030(4).

In 1974, the World Health Organization (WHO) launched the Expanded Program on Immunization (EPI) with a target to vaccinate children worldwide against VPDs (1). Following the introduction of the EPI program, global immunization coverage increased from 5% to 84% DTP3 coverage in 1974 and 2013 (5). WHO

pointed out worldwide coverage of first dose of measles, third dose of DTP and third dose of polio vaccine were 84%, 83% and 84% respectively by the year 2011. Many countries are planning to achieve ≥90% of the immunization coverage in country wide and ≥80% in every district by the year 2020 (6).

The third dose of oral polio vaccine coverage for the South-East Asia Region was 86% at the end of 2012. The South-East Asia Region countries have been conducting Supplementary Immunization Activities (SIAs) as an main approach toward accelerating polio eradication efforts in the area (7).

In Myanmar, Expanded Program on Immunization (EPI) was introduced in 104 townships in 1978. After that it was extended to all areas of all 305 townships by 1997. Nevertheless, the national coverage differ roughly from 38% to 93 % in 2012 due to country's limited health infrastructures and financial support, accessibility to health care services, population movement and difficult-to-traverse terrain (8). The coverage is lower among vulnerable populations (e.g. hard to reach areas or poor resource areas)(9).

Despite the efforts to progress vaccination services, the WHO revealed that globally about 22.6 million of under one year old children did not obtain the third dose of Diphtheria Pertussis Tetanus Vaccine (DTP3) vaccine in 2012(10). Globally, preventable diseases cause about 29,000 under five children death daily. Annually approximately 8 million of children in third worlds die before they arrive at their fifth birthdays; especially under 1year of age (6). One of the VPDs; childhood pneumonia is the world's leading cause of child death, with more than 1.6 million children dying of the condition each year(11). The peak age-specific incidence rate of some childhood diseases such as pertussis has been stated in <1years children, mostly in the first months of life. And the clinical course of those disease; pertussis infection in infants especially with 0-6 months can be severe and this age group accounts for most pertussis-related fatalities (12).

In spite of good achievement and improving immunization coverage in many countries, timely vaccination has become a main challenge. Vaccine coverage rates are most commonly used as health indicators for evaluation and monitoring of immunization program achievements. Nevertheless, satisfactory improvement of coverage may not have a direct correspondence with disease protection. Instead,

timely immunization is essential to protect the child from diseases in early life when the child is prone to vaccine preventable diseases as the unvaccinated children during the days of delay. The timeliness of the vaccination is critical to attain the highest level of immunity to prevent the target diseases; children should obtain all recommended vaccines with timeliness (13-15). The World Health Organization and UNICEF recommended that vaccine strategies and global childhood immunization is to develop surveillance on deviation from age-appropriate immunization in third worlds and apply as another child health indicator of monitoring quality of vaccination (16).

In addition, although some countries have achieved the high immunization coverage with the progression towards the elimination of certain diseases, they are still facing with vaccine preventable disease (VPD) re-emerging. In order to prevent re-emerging of VPD such as Diphtheria, it is essential to sustain high vaccination coverage for at least 95%. For example, in Latvia, Diphtheria retains a major public health issue with continued circulation of toxin-producing stains of C. diphtheriae. In Latvia, from 1994 to 2014, 1,515 diphtheria cases were reported with 7.3% case fatality rate (17).

In low and middle-income countries (LMIC), vaccine-preventable diseases cause 10 million deaths among under five children every year. Missed vaccination of recommended World Health Organization (WHO) vaccines causes most child morbidity and mortality by age two, and once infected can be disadvantageous to the child's health and well-being. Globally, only three-quarters of the child population access basic vaccination(18). Implementation of new vaccines by LMIC countries has not been fast as in high-income countries. For instance, in 2010, pneumococcal conjugate vaccines has not been introduced yet in their nation schedule in 13% of the total high income country birth cohort lived in countries. Of the total LMIC birth cohort, pneumococcal conjugate vaccine was not introduced in the schedule in 98% lived in countries. Coverage gaps exist, not only within countries but also between countries. In 2010, the third dose of DPT vaccine coverage and with measles vaccine in LMIC was 16% and 15% below that of high-income countries, correspondingly. Immunization coverage can be found lower in informal settlements of the metropolitan poor, especially in areas with temporary mobile populations (19).

In Myanmar, measles; one of the vaccine preventable diseases, is high prevalence for children. Measles is always becoming outbreaks at least 1 in 4 to 5years and it is severe if it occurs(20). Measles causes a higher percentage in young children causing higher mortality rate, owing to prolonged contact to infected family in the crowded living space of informal settlements (21). Measles distributed 3% of causes of deaths of children under 5 in 2013(22). The mortality and morbidity due to measles infection is high although it can be avoided by vaccination(20). Some other Vaccine Preventable Diseases have also re-emerged frequently in Myanmar. For example, Japanese encephalitis (JE) has occurred in sporadic outbreaks in recent years and sentinel surveillance in a major children's hospital found out that with 70% proportion of rotavirus infection in admitted diarrhea cases in the peak winter season (23). Those outbreaks reveal the subsistence of populations with incompletely vaccinated or unvaccinated children which are populations whose herd immunity is poor to stand the transmission of the vaccine preventable diseases(24). According to Ministry of Health and Sport Myanmar EPI multiyear plan 2012-2016, some vaccines such as JE, rubella, pneumococcal, typhoid and rotavirus are considered for introduction based on the disease burden in the routing immunization program.

Limited service accessibility to both socioeconomically and physically hard to reach areas; hilly zones, border areas and slum communities in large cities is one of the barrier to achieving successful immunization program. Ministry of Health and Sport Myanmar (MOHS) is implementing Expended Program of Immunization (EPI) program in order to achieve 90% coverage countrywide and at least 85% coverage in all districts locally in 2016 (3). National vaccine coverage is estimated to be 76%. In order to protect the entire population or to achieve herd immunity, immunization coverage for highly infectious diseases such as Measles is needed to be 90-95% (21).

Health care services in developing urban areas would be faced to keep pace with population growth, causes 'pockets' of poor health service infrastructure, especially in newly emerging slums and peri-urban areas. In 2014, the WHO and its partners acknowledged children in deprived informal settings were identified as a priority group for targeted interventions to progress vaccination coverage(25). Because of its high population density and continuous influx of a new pool of infectious agents

with the immigrating population, urban slum areas are prone to outbreaks of infectious diseases (26).Migration among the households has been concerned as one of the behaviors favoring low children immunization coverage (27).

Several studies revealed that lower coverage of complete vaccination in slums compared to other urban areas, as well as a shortage of health facilities and immunization programs near slum settings (28). From a study in urban slum of Bahawalpur City in 2014, the prevalence of complete immunization among the children was only 48% while half were partially immunized and the study found maternal education and family income were most significant predictors (29). Also a research that was done in an urban informal settlement of Nairobi in Kenya revealed that the coverage with the full vaccination was 57.7%. Caregiver ethnicity, age, education and place of delivery were associated to the immunization (30). A vaccination study in slum of India found that only 57% of children had received complete recommended immunization (31) . A study conducted in urban slum of Nepal indicated that 26% of children were partially vaccinated with the influence factors of home delivery, family residing on rent and poor knowledge and perception towards immunization (32).

Due to the lack of proper sanitation, poor water quality, low socioeconomic status, migration and unhygienic neighborhood, the slum people especially young children are prone to be infected by epidemic diseases such as measles, diarrhea, pneumonia etc. Quality immunization services are essential for community in slums not only because they are prone to the risk due to crowded community and poor environmental surroundings but also the resident population are under protected against vaccine-preventable diseases (33).

The explanation for poor immunization coverage among the children has been broadly into three categories: reason involving to health system, related to the health providers and reason relating to the caregivers. So, the role of caregivers is also essential towards good vaccination coverage (34).The study was focused to factors related to the immunization status among the caregivers with under three years old children from urban slum population.

Many studies have carried out to understand the factors related to the utilization of immunization in different regions. A study from Nigeria identified that

not only individual-level characteristic; migrant disruption, selectivity such as socio-demographic characteristics, and utilization of health care, but also community-level factors; region of residence and percentage of mothers who delivered in hospitals are vital in high-quality immunization coverage among migrant children(27). A study conducted in slum setting of Nepal revealed that the home delivery, a primary caregivers with low knowledge regarding vaccination and negative perception towards immunizing sick child were the significant barriers towards complete immunization(30). A recent study in mountainous areas of Myanmar found out that health volunteer and health system support such as volunteer help towards immunization program was the most important factors to the utilization of complete childhood immunization(20).

In Myanmar, a few studies regarding childhood immunization were conducted in different regions of the country. The latest study was in hill tribe region in 2015, but no study had revealed to understand the knowledge concerning the utilization of childhood immunization status in urban slum setting where significant health disparities exist and most susceptible to vaccine preventable disease outbreaks. The percentage of complete immunization with timeliness among the slum children and the caregivers' determinants towards utilization of vaccination were unknown. Therefore, this study aimed to fill the existing knowledge gap by identifying factors associated with childhood immunization of slum-dwelling population. The benefit of the study was to have deeper understanding of the factors contribution on immunization status; completion of types of EPI vaccines, timeliness and utilization of immunization service and achieving the target for timely complete immunization among the caregivers of urban slum of Myanmar. As well as the study intended to make health information to support health policy makers to develop better health service especially for vulnerable community in near future.

1.2 Research questions

- What are the factors associated with utilization of immunization service among under 3years old children in urban slums of Chanmyathazi Township, Mandalay, Myanmar?

- What is the prevalence of complete immunization of under 3years old children in urban slum of Chanmyathazi Township, Mandalay, Myanmar?

1.3 Research objectives

1.3.1 General objective

- To identify the factors associated with utilization of immunization service among under 3years old children in urban slums of Chanmyathazi Township, Mandalay, Myanmar.

1.3.2 Specific objectives

- To describe the predisposing, enabling and reinforcing towards utilization of immunization service among under 3years old children in urban slums of Chanmyathazi Township, Mandalay.
- To examine the prevalence of immunization of under 3 years old children in slum urban area of Chanmyathazi Township, Mandalay.
- To assess the association between predisposing, enabling and reinforcing factors and utilization of immunization service.

1.4 Conceptual Framework

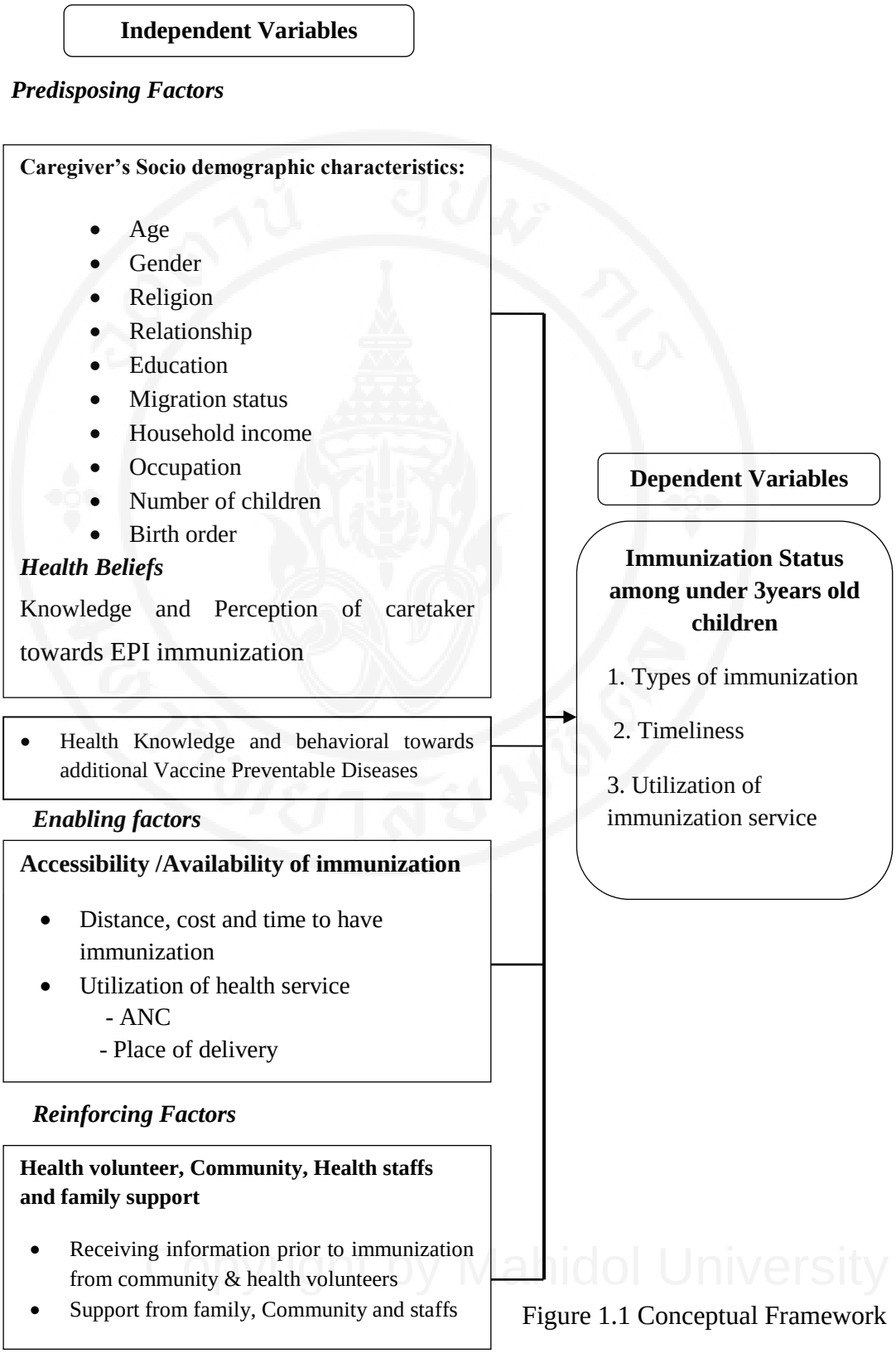


Figure 1.1 Conceptual Framework

1.5 Operational definitions

1.5.1 Dependent variable

1) **Types of immunization** refers to the completion of all types of childhood EPI immunization that contain BCG 1 dose, pentavalent vaccine 3 doses, Oral polio vaccine 3doses, Polio injection 1dose and Measles vaccine 2doses with regardless of timeliness.

2) **Timeliness** refers to the correct time when the immunization is received at the appropriate age, defined as three days prior to twenty eight days after the national recommended age. The same definition was used in other studies also (35, 36). Timeliness was examined with immunized group without considering completion (full or partial) of the immunization.

3) **Utilization of Immunization** refers to not only the use of all types of EPI immunization vaccines that contain BCG 1 dose, pentavalent vaccine 3 doses, Oral polio vaccine 3doses, Polio injection 1dose and Measles vaccine 2doses but also with timeliness.

1.5.2 Independent variables

1.5.2.1 Socio-demographic

1) Caregiver refers to the primary person who is taking care of the under 3years old children, such as mother, father, grandmother, and relatives.

2) Religion refers to the respondents who believe and practice any religion among Buddhist, Christian, Muslim and Hindu.

3) Education refers to education level of the respondent who is taking care of the child completed from institution.

4) Migration refers to the movement of the child's family from one area to another.

5) Household income refers to the money earned by all family members in a month.

6) Occupation refers to the job of the child's caretaker. E.g, housewife, seller, daily worker.

7) Number of children refers to the number of children in the whole family at the study time.

8) Birth Order refers to the order a child is born in their family.

1.5.2.2 Caregiver's perception toward immunization refers to the perceived susceptibility and severity of the vaccine preventable diseases and also the perceived benefits and barriers of the immunization.

1) Perceived susceptibility refers to the child caregiver's personal belief about the likelihood of their child to develop the vaccine preventable diseases.

2) Perceived severity refers to the child caregiver's personal belief on the serious consequences that their children have to bear with vaccine preventable diseases.

3) Perceived barrier refers to the child caregiver's personal belief regarding the obstacle for the utilization of immunization services.

4) Perceived benefit refers to the child caregiver's personal belief or idea about the benefits concerning vaccine preventable diseases.

1.5.2.3 Knowledge of caregiver's toward immunization refers the understanding of child caregivers regarding the importance of immunization, side-effects of vaccines and immunization schedule and about the diseases preventable by childhood immunization.

1.5.2.4 Health Knowledge and behavioral towards additional Vaccine Preventable Diseases refers to the understanding of child caregiver about the other additional vaccine preventable diseases that are not included in national immunization program and utilization of the service.

1.5.2.5 Enabling Factors

1) Accessibility and availability refers to the distance, time and expense available of the child's primary caregiver to go to the immunization center.

1) Time to reach immunization center refers to time taken to go to the immunization.

1.5.2.6 Reinforcing factors

1) Receiving information prior to immunization refers to if the child's caregivers receive the information about monthly immunization activity (date and time) from the health staffs, health volunteers and others.

1.5.2.7 Immunization card refers to the card that includes the details information of the child's immunization schedule.

CHAPTER II
LITERATURE REVIEW

2.1 General Information of childhood vaccination

Immunization is believed as the most effective and safe form of medicine made from dead or modified disease-causing agents administered either orally or injected, in order to raise the number of protective antibodies and prevent children from being victims of diseases caused by viruses and other infectious organisms(18).

Immunization is acknowledged as, a core constituent of the human right to health and the responsibility of an individual, community and government. It is also a protective health behavior that is directed toward the child from vaccine-preventable diseases such as illness, disability and deaths including tuberculosis, diphtheria, Pertussis, tetanus, hepatitis B, pneumonia, meningitis, measles and polio by the caretakers(19, 20). WHO estimates that globally immunization against vaccine preventable diseases prevent approximately 2.5 million of under-5 children deaths annually(30).

Children who had immunization have the high opportunity to thrive and a better chance of realizing their full potential. Vaccination has facilitated drive this decrease in child morbidity and mortality: immunization coverage that has been in use since the inception of the Expanded Program on Immunization has expanded and new vaccine have been introduced. Hepatitis B and Haemophilus influenza type b vaccines have become part of routine immunization schedules in 179 and 173 countries. The number of fatality caused by traditional vaccine-preventable diseases has reduced from approximately 0.9 million to 0.4 million in 2000 and 2010 (19).

The natural occurrence of smallpox was eliminated by the WHO immunization campaign from 1967 to 1977. Since the launch of Global Polio Eradication Initiative by WHO and its partners in 1988, worldwide number of cases of poliomyelitis has dropped by over 99%(31). Most of the diseases need 80%-100%

immunization coverage (e.g. 95% of the population is required to be vaccinated for Measles when at least 80% coverage for Pertussis) (20). The low vaccination coverage for measles is of particular health concern given both the specific and non-specific beneficial effects of measles vaccine on childhood morbidity and mortality recognized in a number of studies in the developing world. The other concern with Measles immunization low coverage is the lack of herd immunity(30). Herd immunity is provided by high coverage of measles vaccine thereby falling risk for measles exposure and affording protection to the small proportion of individuals who are not vaccinated(31).Herd immunity is a fundamental benefit of childhood immunization, but it is unknown if the conception of benefit to others influences parents' decisions to vaccinate their children(37). Even though the wide acceptance of vaccination as one of the most effective and successful health interventions globally and the extensive body of supporting evidence, not all parents choose to vaccinate their children according to recommended schedules. Low vaccination coverage can have disastrous consequences for individuals and communities. Decisions to delay or avoid vaccination not only expose individuals to increased risk of disease but can also undermine herd immunity and raise the frequency and severity of outbreaks of vaccine preventable diseases(38).

Developing childhood timely immunization coverage is a main health strategy purpose in many least developed regions. Vaccination is a main strategy for dropping the occurrence of infectious diseases, and particularly in poor resourced areas, and it is a highly cost-effective for developing health systems to spend and has prevented up to 24% of the 10 million under five children death every year (39). However, immunization has always faced several adversities, the most recent being the suspicion that it is a global conspiracy against chosen communities, particularly those in LMIC (5).

Nevertheless, the percentage of the world's immunization coverage for recommended vaccines has remained stable for the past few years(6). According to The United Nations Children's Fund (UNICEF) estimation, globally one in every five new borns do not receive at least one or more of the three doses of DPT vaccines, which could be life-saving (40).Young children have partial immunizations for several reasons that are mostly unaware of benefits of immunization or lack of concern for severity of side effects(20). Limited accessibility to services, poor awareness of

caregivers, high dropout rate and missed opportunities are major barriers causative to low immunization uptake (41).

Although some countries have achieved the high immunization coverage with the progression towards the elimination of certain diseases, poor healthcare systems, poverty and other social factors have directed to vaccine preventable disease re-emerging and remaining endemic in many parts of the world. In order to prevent re-emerging of VPD such as Diphtheria, it is essential to maintain high vaccination coverage for at least 95%. For example, in Latvia, Diphtheria retains as a public health problem with continued circulation of toxin-producing stains of C. diphtheriae. In Latvia, from 1994 to 2014, 1,515 diphtheria cases were reported with 7.3% case fatality rate (17).

The acceptability for immunization is needed for complete vaccination and that includes high awareness of benefits, knowledge of vaccine doses, no fear of vaccines, inspiration to presented services and overcoming challenges for seeking immunization services (26, 42). There are two challenges to receipt of immunization services. They are 'service utilization' barriers that include parental knowledge towards the importance of vaccination, and the immunization sites and times at which they are given. In slums, challenges to immunization services utilization manifest in numerous ways. Temporary migrant people, which can be a large percentage of urban city populations, may use few health services, and seasonal migration makes difficult the estimation of target community for routine immunization services and obstructs health providers from tracing immunization defaulters. 'Service access' barriers contain immunization services availability, including suitable scheduling and spatial appointment of vaccination sessions, adapting services to the local cultural situation, ensuring sufficient vaccine supply and health personals availability, and reducing missed opportunities for providing vaccinations during other health service contacts (25). The types of vaccine widely used are:

a) BCG (Bacillus Chalmette-Guerin) vaccine that prevents tuberculosis

b) Pentavalent vaccine that prevents Diphtheria, Pertussis, Tentanus, Hepatitis B and Haemophilus influenza type B (Hib)

c) Measles vaccine and

d) Polio vaccine

BCG, Measles and Polio vaccines are live attenuated vaccine. Pertussis, Hepatitis B and Haemophilus influenza type B are recombinant sub-unit vaccine while Diphtheria and Tetanus are toxoid.

According to the World Health Organization (WHO) guiding principles, complete immunization is defined as if a child obtains BCG vaccine, measles vaccine, three doses of polio vaccine, and three doses of DPT (diphtheria, tetanus, and Pertussis). Children are considered to have incomplete vaccination if they did not obtain one of these vaccines (43). Children are assumed as not vaccinated if they do not get any dose of vaccines(6). Adequate protection from vaccine preventable diseases can be achieved by receiving of these all vaccines at the recommended ages and intervals(44).

BCG: Bacille Chalmette-Guerin, is a vaccination against tuberculosis (TB) disease. It can affect not only to join and lungs but also brain. It can lead to debility and death.BCG is applied in many regions with a high occurrence of TB to prevent childhood tuberculosis, military disease and meningitis(45).

Measles: Measles is a very transmittable viral infection that causes a rash all over the body. It can affect 90% of people who have no immunity. Measles can lead to serious health problems such as pneumonia, and it can also cause seizures or meningitis in rare cases. Measles is the top cause of vaccine preventable diseases to child death. Measles vaccine is a live attenuated vaccine that is given subcutaneously. Some mild symptoms such as fever up to 103'F, swelling of glands in neck and mild rash can be followed after the vaccination(46, 47).

Polio: Polio is a transmittable disease that is caused by the polio virus type 1, 2 and 3. There is muscle weakness that resulting in an inability to improve in 0.5% of the cases. The weakness is commonly happened in the legs but it is lesser involved in the muscles of the head, neck and diaphragm. Polio is usually transmitted from person to person through fecal oral route. Polio can be prevented by both oral polio vaccine (OPV) and injected polio vaccine (IPV)(48).

The common polio vaccine which is used in worldwide is the trivalent oral polio vaccine (OPV) that includes three types of live, attenuated vaccine viruses. Oral Polio Vaccine makes immunity against all three types of polio virus in the gut of a

immunized child, in order to prevent the agents from entering the nervous system and the bloodstream to cause paralysis(49).

Pentavalent: Pentavalent vaccine prevents five diseases; Haemophilus influenza type B and Diphtheria, Pertussis, Tetanus and Hepatitis B. The vaccine is given intramuscularly, anterolateral aspect of upper thigh or deltoid muscles in children aged between 2^{nd}, 4^{th}, 6^{th} months. The child may suffer adverse reactions such as local tenderness, redness at injection site, irritability and having mild fever after the immunization.

Diphtheria is transmitted from one person to another by close physical and respiratory contact. Diphtheria can cause (serious) respiratory infection that involves swollen neck & throat, barking cough, bull neck, strider and difficulty breathing. Diphtheria can only be prevented by high immunization coverage with the community.

Pertussis is also called as whooping cough and it is a highly communicable disease. It can be spread from person to person thorough airborne droplets. It can cause to vomiting or fainting after cough, sub conjunctiva hemorrhage and paradoxical cough.

Tetanus is one of the highly fatal preventable diseases in developing countries. It is caused by the exposure of spores of Clostrium tetani from the contaminated soil or unclean wounds. The disease is severe in new born babies and it is called neonatal tetanus(20). In 2008, estimated deaths due to neonatal Tetanus were 59,000 and those were mainly occurred in resource poor communities(50).

Haemophilus influenza type b (Hib) disease is a severe vaccine preventable disease which is caused by bacteria. It usually occurs in under 5 years old children. The disease can also causes infections of the joints, blood, bones & covering of the heart severe, swelling in the throat and making it hard to breathe, pneumonia and death(45).

Hepatitis B virus can affect of the liver, followed by inflammation of liver, liver cell damaging, cirrhosis and liver cancer. Hepatitis B can be infected at birth and the infants may become the disease carriers(20).

2.2 Immunization Program

2.2.1 Global Settings

In 2015, the United Nation member state has recently implemented, the Sustainable Development Goals (SDGs). Particularly, the third goal recommends for countries to build enabling environments in which healthy lives shall be promoted and strive to end preventable deaths of all persons at all ages, including new-borns and under-five. It has set a target to decrease neonatal mortality to below 12 and under-five children mortality to 25 per 1,000 live births as a minimum by the year 2030(18).

Following the introduction of the Expanded Program on Immunization in 1974, global immunization coverage rose from 5% to 84% DTP3 coverage in 2013. The EPI is far from achieving the achievement experienced by the smallpox eradication program(5). The under-five mortality rates have decreased from 96% in 1990 to 52% in 2014, mostly due to immunization (18). Two main elements are included in progressing the coverage: developing accessibility to immunization services and reducing vaccine dropout rates. While health care systems in LMIC appear to develop accessibility to immunization services steadily, the overall change in vaccination coverage stays suboptimal. In Ethiopia, for instance, the immunization coverage showed significant improvement from as low as 42% in the 1990s to more than 88% in 2013, and the country has rose the number of diseases prevented by the program from six in 1980 to ten in 2013(51). In East Java, without providing rubella vaccination, nearly 700 babies are expected to be born with CRS annually at an incidence of 0.77 per 1000 live births(52).

World Health organization mentioned worldwide coverage of third dose of DTP, first dose of measles and third dose of polio vaccine were 83%, 84% and 84% respectively by the year 2011. Many countries are planning to attain vaccination coverage of equal or above 90% and 80% nationally and in every district by the year 2020(6). Generally, covering as many diseases as feasible, guarantee vaccine potency and achieving high immunization coverage are necessary requirements for childhood vaccination to have the desired public health impact of decreasing mortality and morbidity, and possibly eliminating some of the vaccine-preventable diseases(51).

In 2007, despite the efforts to progress vaccination services, approximately 27 million infants were not immunized against measles or tetanus. 22.6 million Children are still not attained by routine immunization services, of which 15.3 million (65%) resides in resources poor countries(41, 53). About 95 percent of the expected 14 million of under 5 children death worldwide occur in developing countries; approximately 70 percent of these deaths are due to vaccine-preventable diseases (27). In 2012 the WHO revealed that about 22.6 million of under one year old children in worldwide did not receive Diphtheria Pertussis Tetanus Vaccine Three (DTP3) vaccine and above 70% of these children lived in ten countries of the Democratic Republic of Congo, Nigeria, Pakistan, Philippines, Uganda, Ethiopia, India, Indonesia, Iraq and South Africa(10). In Guinea-Bissau in West Africa, although measles mortality has fall by an estimated 75% between 2001 and 2014, measles was still the top cause of vaccine-preventable deaths in children in 2016. The World Health Assembly has dedicated to increase MV coverage to at least 90% nationally and regional measles elimination goals have been set(54).

The mission of the Decade of Vaccines is to expand, by 2020 and beyond, the full benefit of immunization to all people, in any case of where they are born, who they are or where they live (19). In many developed countries, childhood vaccination coverage rates are moderate to high. For example, Australia has a comprehensive subsidized vaccination program for children and adults, and vaccination coverage leaves moderately high, with 92.3% of children at 12 months of age fully vaccinated in 2015. Yet coverage remains lower the nation's inspirational target of 95%(38).

The pockets of under vaccination continue to persist in some developing countries, although the recent trend related to global vaccination coverage is encouraging with 120 countries reaching 90% DTP3 coverage in 2008. In Pakistan that is one of the six countries with the highest number of children who did not obtain the DPT-3 vaccine within their first year of life , the condition of fully immunized children was at 56% in 2014 (1). In Nairobi, 73% of children in this age range are accounted to have obtained all vaccinations, but estimates in the slums within the city are usually much lower. Complete immunization coverage among 12-23 months children in Bangladesh as a whole is 75%, only 54% of children of the same age are completely immunized in the urban slums of Dhaka(30).A study done in India in 2008

revealed that the 826,000 deaths in under 5 children, almost three quarters or 604,000 deaths were due to vaccine-preventable diseases including measles, meningitis, diarrhea, Pertussis and pneumonia(55). A study from Nigeria identified that not only individual-level characteristic; migrant disruption, selectivity such as demographic and socio-economic characteristics, and health care utilization, but also community-level factors; region of residence and proportion of mothers who had hospital delivery are vital in high-quality immunization coverage among migrant children(27). A study in Wales found that the uptake of routine childhood immunizations was significantly lower in children resident in the most socio-economically deprived areas compared with the least deprived, and that the differences increased with age. Measles cases have confirmed a significant rise, reaching a peak of 6193 in England and Wales in 2013. Coverage is also uneven and demonstrates notable geographic and social disparities, with uptake lower among marginalized, economically deprived and/or socially inaccessible groups(56).

In many third world countries, immunization coverage and equitable delivery of services are still major concern and challenges especially in some areas; isolated regions and informal settlements, where incomplete immunizations and non-uptake of immunization services are poorly understood. The outcome indicated that one-fourth (25.8%) of children had incomplete immunization. The partial immunization coverage is still a major concern in many third world countries particularly in remote immunization prevalence was high in urban areas (57.6%) and rural areas (42.4%). Insufficient immunization levels against childhood diseases remain an insignificant for public health concerns in resource-poor areas of the globe (20, 25).

2.2.2 South East Asia Settings

Every year, globally 1.5 to 2 millions of children die because of vaccine preventable diseases for which vaccines are available, although not completely applied. Among them, 25 to 30% of children deaths come from South East Asia Region (57).SAGE with Western Pacific Region (WPR) mentioned on the endorsement by the Regional Committee of 2017 as the year for the target to decrease

the prevalence of Hepatitis B surface antigen , to less than 1% in under 5 years old children.

In 1988, the estimation global polio disease burden was >350 000 cases, of which the World Health Organization (WHO) South-East Asia Region contributed >70%. The 11 countries of the South-East Asia Region reported 25,711 paralytic poliomyelitis cases in 1988, and the estimated polio burden was most likely 10-fold higher because of substantial underreporting. In the 5 countries with the major populations in the region, Bangladesh, India, Indonesia, Myanmar, and Nepal, which also had the highest wild poliovirus burden, the WHO offered additional support for AFP surveillance with a network of surveillance medical officer. At the end of 2012, the routine immunization coverage of the third dose of oral polio vaccine for the South-East Asia Region was 86%. Countries in the South-East Asia Region have been using Supplementary Immunization Activities (SIAs) as an vital strategy toward accelerating polio eradication efforts in the area(7).

A conference statement from the Asia and Pacific Advisory Board in October 2000 stated that PCV-7 would cover around 46% of pneumococcal serotypes causing IPD in Asia but, the coverage would vary from country to country(58). Among ASEAN countries, a pentavalent diphtheria and tetanus toxoid with whole cell Pertussis, Hib and Hepatitis B vaccine is the majority common. The Pentavalent vaccine is accessible in three doses at 6, 10 and 14 weeks in Cambodia, Laos and the Philippines; 2, 3 and 4 months in Indonesia and Vietnam; and 2, 4, and 6 months in Myanmar(2).

Despite, the coverage has been improving in the regions; vaccine preventable diseases still exist. An estimation of 110,000 annual births continue affected by rubella and congenital rubella syndrome in worldwide with almost half in South-East Asia(52). The total numbers of reported cases of vaccine preventable diseases in South-East Asia Region from 2011 to 2015 are shown in Table 2.1.

Table 2.1 Reported cases of Vaccine Preventable Diseases in South-East Asia Region (2011 to 2015)

Diseases	2015 cases	2014 Cases	2013 cases	2012 cases	2011 cases
Diphtheria	2’504	7’666	4’080	3’953	5’179
Measles	29’927	41’346	30’101	46’945	69’546
Mumps	42’937	38’327	36’352	47’086	50’626
Pertussis	29’813	54’953	37’602	45’847	42’867
Polio	2	0	0	0	1
Rubella	5’185	9’690	10’434	6’877	9’810
Neonatal tetanus	973	658	721	872	1’076

Source: WHO vaccine-preventable disease monitoring system, 2016 global summary(59)

In Nepal, in 2011, for 16.4 % of the children were being absent fully immunized by twelve months of age. Vaccine dropout rate between the first and third dose of pentavalent vaccine was 5.2 %. In slum areas along Bishnumati River in Kathmandu, the overall coverage of measles containing vaccine was 67.2 % in 2008. The study revealed that the home delivery, a primary caregiver with low knowledge regarding vaccination and negative attitude towards vaccinating a sick child were the significant barriers towards complete immunization(32).

In Bangladesh, the coverage of complete immunized children raised from 52% in 2001 to 63% in 2003 and to 71% in 2006. Nevertheless, an estimation of 1.5 million children remains unprotected, with vaccine dropout rates between 20 and 30% and a difference of vaccination likelihood between urban- and rural-born children of approximately 10%. The measles vaccine has the lowest coverage rate, with 68% for urban children and 62.4% for rural children, and overall in Bangladesh only 64.1% of children obtained the measles vaccine(60).

2.2.3 National Settings: Myanmar

In Myanmar, Expanded Program on Immunization (EPI) was introduced in 1978 in 104 townships. After that it was extended to cover up almost all areas of all 305 townships by 1997. Nevertheless, the national immunization coverage varies roughly from 38% to 93 % in 2012 because of country's limited health infrastructures and financial support, accessibility to health care services, population movement and difficult-to-traverse terrain(8).

According to the nation standard recommendation, pentavalent vaccine can be caught up until 36 months, and Polio (oral) and Measles vaccination can be immunized till 60 months of the child's age. Children immunization status is as schedule and details schedule is shown in Table 2.2.

Table 2.2 National Children Immunization Schedule in Myanmar 2015

Vaccine	Schedule
BCG	Birth-2 months
Penta	2,4,6 months
Polio (injection)	4 months
Measles Rubella	9 months
Measles	18 months
Polio (oral)	2,4,6 months

Source: EPI Ministry of Health and Sport Myanmar, (61)

Myanmar is trying to accomplish MDG 4 to decrease two thirds the mortality rate among under 5 years old children by promoting immunization programs and measles control. In Myanmar, immunization coverage is still low in vulnerable

communities. Secondly, 256 (76%) districts reported more than 10% drop-out rate (20).

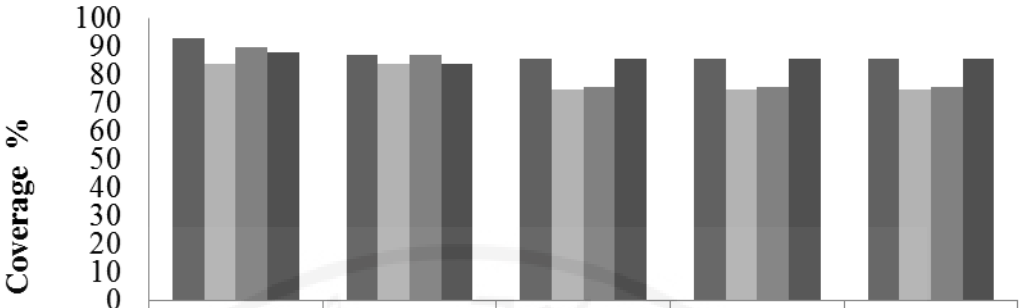
Frequent outbreak of measles and high child morbidity and mortality rate in the country are among the consequences of unsatisfactory immunization coverage(6). It is always becoming outbreaks at least 1 in 4 to 5 years and it is severe if it occurs(20). For example: In April 2006, a case of type 1 vaccine derived poliovirus (VDPV) was reported. After several years without WPV cases, an outbreak of 11 type 1 WPV cases occurred in Myanmar in 2007, which was confirmed as the re-introduction of WPV, with the last reported paralyzed case in May 2007. Consequently, an additional four type 1 VDPV cases were reported in 2007, and a type 1 VDPV case was reported in December 2010(62).

In Myanmar, some other Vaccine Preventable Diseases have also reemerged frequently. For example, Japanese encephalitis (JE) has occurred in sporadic outbreaks in recent years and sentinel surveillance in a major children's hospital found out that with 70% proportion of rotavirus infection in admitted diarrhea cases in the peak winter season (23).

Those outbreaks reveal the presence of populations with partially vaccinated or unvaccinated children which are communities whose herd immunity is not high enough to stand the transmission of the vaccine preventable diseases(24).

According to Ministry of Health and Sport Myanmar EPI multiyear plan 2012-2016, some vaccines such as JE, rubella, pneumococcal, typhoid and rotavirus which are underused can be considered for introduction, based on the disease burden in the community. The EPI multiyear plan (2012-2016) included not only to identify and build consensus on priority diseases and new and underused vaccines but also to plan for introduction of new vaccine in routine EPI as needed.

There are still child morbidity and mortality because of vaccine preventable diseases, although the vaccination coverage through the EPI has been stabled in Myanmar. The national immunization coverage and numbers of reported vaccine preventable diseases are shown in Figure 2.2 and Table 2.3 (63).



	2011	2012	2013	2014	2015
BCG	93	87	86	86	86
DPD3	84	84	75	75	75
OPV3	90	87	76	76	76
MCV1	88	84	86	86	86

Figure 2.1 Myanmar Immunization Coverage series (2011-2015)

Source: WHO & UNICEF estimates national immunization coverage, July 2016 revision (63)

Table 2.3 Reported cases of Vaccine preventable diseases of Myanmar (2011-2015)

Diseases	**2015 cases**	**2014 cases**	**2013 cases**	**2012 cases**	**2011 cases**
Diphtheria	87	29	38	19	7
Japanese encephalitis	113	50	3	14	20
Measles	6	122	1'010	2'175	2'046
Pertussis	5	5	14	2	5
Polio	_	0	0	0	0
Rubella	34	30	23	21	103
Tetanus (neonatal)	30	32	39	29	32
Tetanus (total)	_	73	73	75	178

Source: http://www.searo.who.int/entity/immunization/data/myanmar.pdf (63)

2.3 Immunization Timeliness

In many countries, despite good achievement and improving immunization coverage, timely vaccination has become a main challenge. Vaccine coverage rates are most commonly used as health indicators for evaluation and monitoring of immunization program achievements. Nevertheless, satisfactory improvement of coverage may not have a direct correspondence with disease protection. Instead, timely immunization is essential to protect the child from diseases in early life when the child is prone to vaccine preventable diseases like the non-vaccinated children during the days of delay. The timeliness of the vaccination is critical to attain the highest level of immunity to prevent the target diseases; children should obtain all recommended vaccines with timeliness (13-15).

Untimely immunization favors for children having illness, including measles, pertussis, polio and Haemophilus influenza type B, all which have very high morbidity as well as mortality in early infancy. Therefore, measuring also timely vaccination is more informative and comprehensive to monitor the risk of a child obtaining a disease (64).

Moreover vaccines can have non-specific effects on morbidity and mortality among young children; these can be influenced by timeliness of immunization, with potential negative consequences of delayed vaccination. Similarity, vaccine doses that provided early are said to be unacceptable and it contributes to overall coverage figures, directing to an overestimation of actual population immunity. Hence, timely administration of vaccines has vital implications for the success of childhood immunization programs (35).

Delayed immunization is common among children from lower and income countries (65). A study in India revealed that only 30% of the total children timely BCG (Bacille Calmette –Guerin) vaccine for tuberculosis, 28% received the first dose of DPT (diphtheria, pertussis and tetanus) vaccine with timeliness and only 12% received measles vaccine by the recommended age of 9 months (66). Therefore, the World Health Organization and UNICEF recommended that global childhood immunization and vaccine strategies is to develop surveillance on deviation from age-appropriate immunization in third worlds and apply as another health indicator of evaluating quality of immunization (16).

2.4 Slum Problems

In 1976, 1.5 billion of people lived in city areas, and one-third was slum dwellers. In 2002, 3 billion or 47% of the population lived in cities and 1 billion or 16% lived in informal settings 44. It is estimated that seven in ten people worldwide are projected to be urban-dwelling by 2050. Most urban population growth in the next thirty years is expected to occur in developing worlds, with 86% of this growth accounted for by Africa and Asia. Urbanization, defined as the enlarge in the urban-dwelling percentage of a population resulting from migration from rural areas or natural urban demographic growth, creates many opportunities but also exists challenges for human health and wellbeing(25).

Most of the urbanization is happening in the least developing countries and many municipalities do not have the capacity for infrastructure to solve with the rapid growth and lack both financial and human resources to provide basic utilities. In all regions of the developing countries, the growth of slums, also known as informal settlements, is appallingly visible. Families and individuals move from rural to urban areas for several purposes: (1) employment opportunities with good incomes, (2) availability of more and better social services and health care, (3) better water supply and infrastructure, (4) educational opportunities, and (5) the reality of increasingly fractionated family lands yet more mouths to feed, declining crop production, and/or decreasing income from sale of crops. Many rural-urban migrants are of poorer and less educated than their native non migrant neighbors. Urbanization is coupled with certain health risks such as gradually more crowded and inadequate living conditions, lack of safe food and water, and insufficient sanitation, conditions which are particularly apparent in urban slums The urban environment may also increase the risk to create a haven for the rapid spread of infection and the outbreaks from communicable diseases, including vaccine-preventable diseases . The reasons could be because of its particularly unique barriers to the delivery of routine immunization services and the extremely crowded conditions that make sure close contact with infected individuals(25, 67).

Population development in urban areas of low and middle-income countries has mostly been determined by internal rural–urban migration. Between 1995 and 2005, the urban population in low and middle income countries grows by an

average of 1.2 million people weekly. China in 2010, acknowledged over 221 million rural–urban migrants; a 117% raise from the year 2000. Such rate of urban growth poses a challenge to the ability of the health system in LMICs to meet the health needs of the growing urban population and rural–urban migration might be a factor of immunization coverage in LMICs. Increased population mobility coupled with low routine vaccine coverage of migrants has been a significant factor in recent measles and polio outbreaks in LMICs. This has been recognized to the characteristics of urban areas which offer an environment encouraging for outbreaks and rapid spread of infections(53).

Persistent population growth and rising urbanization have led to the development of large informal settlements in many developing countries in recent decades. The high occurrence of poverty, overcrowding, and unhygienic environment observed in these settlement referred to as “slums” and suggests that slum dwelling constitutes a major health hazard for children. Urban residents have grown rapidly over recent decades in both absolute and relative terms, with more than 50%of the global population living in urban areas in 2010. This trend is anticipated to persist, such that more than 60 % of the world’s population is likely to live in urban areas by 2030. The gradually increase numbers of people living in, and moving to, urban areas in developing countries have led to the creation of large and rapidly growing informal settlements. More than 1 billion people, or about 14%of the total worldwide population, were expected to live in slums in 2007(68).

Most of this urban expansion is due to rural–urban relocation leading to the creation of new slums(31).Increasing urbanization has effected in a quicker growth of slum population(26).Many poor and illiterate populations live in these informal neighborhoods, which are characterized by unhygienic living situation and the near absence of the public sector. In general, they exhibit high population densities, which are favorable for the transmission of infectious diseases. Contact to environmental hazards because of contaminants may also be high as these areas are often the unclean sections of cities. Communicable diseases, child illnesses, and malnutrition indicators remain grim for slum dwellers, with considerable urban penalty for children in terms of higher mortality than the rest of the city and rural areas. Moreover, poverty, contamination, criminality, and overcrowding as well as social exclusion and the types

of diseases vary according to the areas. The studies have pointed out that the particular significant disadvantages of the urban poor living in slums, with respect to morbidity, access to health services, mortality(43). The levels of essential service delivery and immunization achievement are also diverse based on categories of slums: the most vulnerable, moderately vulnerable and other slums(26). In certain slums, religious and traditional beliefs avoid receipt of immunization services. A Research confirms that child mortality in low-income urban regions can equivalent or exceeds that in other rural areas(26, 42).

The risk of outbreaks of vaccine preventable disease exists due to its high population density, continuous incursion of a new pool of infective agents with the settler and poor coverage of primary immunization in urban slums(31). The large numbers of children who die from vaccine-preventable diseases (VPDs) live in low-income and-middle-income countries (LMICs). With the rapid urbanization and rural–urban migration ongoing in LMICs, available research recommends that movement status might be a determinant of immunization coverage in LMICs, with rural–urban migrant (RUM) children being less likely to be immunized. Particular efforts to progress immunization coverage in this subpopulation of urban residents will not only decrease morbidity and mortality from VPDs in migrants but will also lessen health inequity and the possibility of infectious disease outbreaks in wider society(53).

Slum-dwelling populations are more likely to fail accessibility health services, even when they are provided, due to fear of costs, risk of losing income, or not knowing where and when services can be obtained. Recent migrants who resident for <12 months to slums are even more vulnerable compared with longer settled slum dwellers. Children living in informal slums are the majority of disadvantaged sub-group and do not advantage from the urban development. The children from new migrants appear to have lower immunization coverage than those who have been settled in an urban-slum area for more than 12 months, suggesting that migrating to a new locale has the most considerable effect on immunization coverage, which then resolves to be similar to the slum-area average over time as a result of adaptation to the new environment. Several studies revealed that lower coverage of complete vaccination in slums compared to other urban areas, as well as a shortage of health facilities and immunization programs near slum settings (28). And these facilities are

often not found in the slums and slum dwellers have to look for public services outside of the slum areas, although immunization services are provided free of charge at public health facilities. They otherwise search for services offered by private practitioners in the slums who are mostly prohibited and offer sub-standard and relatively costly services. This confines access to basic services such as immunization services and may be the main cause for low full immunization coverage(30, 69). From a study in urban slum of Bahawalpur City in 2014, the prevalence of complete immunization among the children was only 48% while half were partially immunized (29). Also a study that conducted in an informal urban settlement of Nairobi in Kenya revealed that the coverage with the full vaccination was 57.7% (30).

Quality immunization services are essential for slum community not only because the resident populations are under protected against vaccine-preventable diseases but also because they are overexposed to the risk because of high density and poor environmental conditions. Thus, improved immunization in slums may not only reduce mortality associated with vaccine-preventable disease but also limit the number of outbreaks and cases and lessen severity of diseases(33).

2.5 Theorical model

In this study, the conceptual framework is constructed based on Health Belief Model and PRECEDE-PROCEDE Model.

Health Belief Model has been useful to a wide range of health behaviors and subject populations. According to Conner and Norman, 1996, three areas can be identified: (a) Preventive health behaviors that include health-promoting, health-risk behaviors, and immunization and contraceptive practices. (b) Sick role behaviors, that refers to compliance with optional medical regimens and (c) Clinic use, which consists of physician visits for a range of reasons.

The model is composed of three main factors that are (1) Predisposing factors such as socio demographic factors and health belief factors (i.e knowledge and perception of child caregivers),(2) Enabling characteristics that facilitate the caregivers to achieve complete immunization status such as availability, receiving information

about immunization and previous health service utilization, and (3) Reinforcing factors that support to compete immunization such as community and family support(20, 70).

PRECEDE-PROCEDE model was firstly initiated by Lawrence Green and Kreuter in 1999 and consist of predisposing factors, enabling factors and reinforcing factors as set in the conceptual framework. Predisposing factors include a person's knowledge, attitude, beliefs, values and perceptions that stop motivation for change. Enabling factors include the availability, accessibility, and affordability of community resources which facilitate the performance of action. Reinforcing factors include social support, family, neighbours and other persons support ect.

In conclusion, the determinants of the utilization of immunization service can be conceptualized by applying PRECEDE-PROCEDE model and Health Belief model. In this study conceptual framework, three main factors from PRECEDE-PROCEDE model; predisposing, enabling and reinforcing factors are adopted as the major variables to the utilization of immunization service. Predisposing factors are related to demographic factors of the caregivers such as age, religion, education, area, income, occupation, number of children and health beliefs towards immunization. Enabling factors consists of accessibility and availability to the service and utilization of previous health service. Lastly, reinforcing factors involves social and family support. From the Health beliefs model, individual health beliefs such as perceived benefit, perceived barrier and perceived threat; susceptibility & severity which are influencing on health behavior, are applied to assess the knowledge level of the caregiver towards utilization of vaccination service.

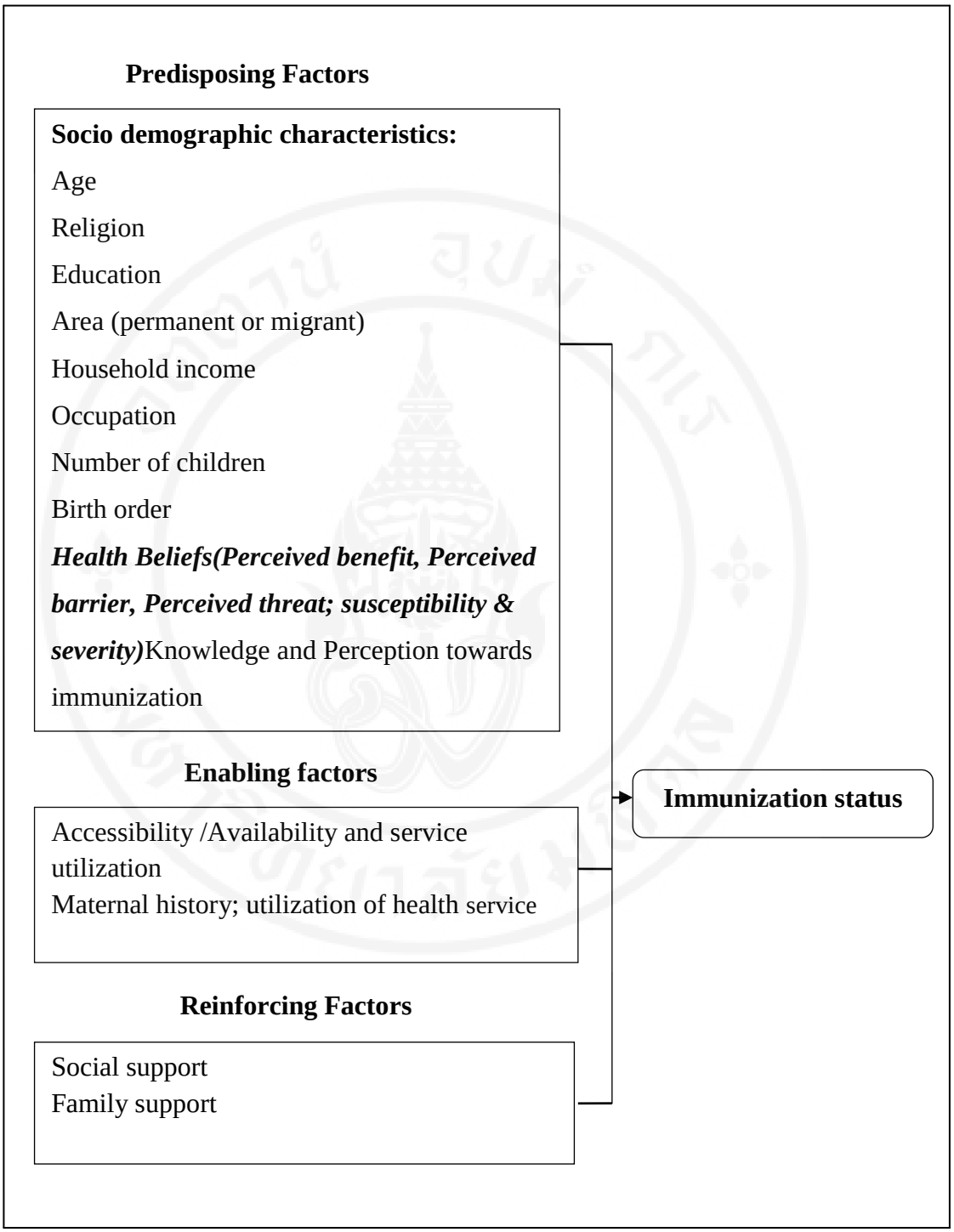


Figure 1.3 Health Belief Model & PRECEDE-PROCEDE Model (20, 70)

2.6 Related Literature Review

2.6.1 Age

A study in urban slums of India found out that younger mothers were more likely to have fully immunized their children. This could be due to the fact that they are likely to have fewer children and are therefore self-motivated to provide health care(31).

2.6.2 Education

Educated caregivers have broader social networks that offer knowledge of good health behaviors and where to find good health care(71) .A study from southern Ethiopia stated that the children from educated caregivers had better probability to be fully immunized than children from not educated mothers(6). Children whose mothers had post-secondary education were twice as likely to have their child fully immunized compared with their counterparts whose mothers had only primary education(18).

A study from Bangladesh also reveled that a positive relationship with child immunization coverage ($\chi 2=27.79$, $p<0.001$) was related with education, where 70.1% of children of mothers with higher education were fully immunized compared with 63.0% of those with secondary education and 60.6 and 55.5 % of those with primary and with no education. (60). Children of the most educated mothers were 1.45 times more likely to have received DTP3 than children of the least educated mothers compared to children from high educated mothers(72).

2.6.3 Migration status

A study on migration and immunization in found out a significant relationship between migration status of the mothers and the receiving full immunization(27) Another study also supported that evidence by stating there is an association between rural–urban migration and immunization coverage in low and middle income countries being less likely to be fully immunized than the urban non-migrants and the general population. (53) Children in migrant communities in China, India, and Nigeria have been found less likely to be fully immunized than urban non-migrants; and more recent migrants have lower coverage than settled migrants

partially explained by the authorized status of migrants, which can impact on uptake of services and health outcomes(69).

2.6.4 Household Income

Women with the top good household socioeconomic were significantly more likely to fully immunize their children(60). A study from Pakistan found out that household level of income was significantly related with immunization at 5% level with possibility less than 0.0001. In the study, about 40% of the household heads having income greater than Rs. 10000/- are did not immunized their children as compared to 60% whose income is less than or equal to Rs.10000/(73).

2.6.5 Occupation

Working children caretakers or mothers do not receive the support required to attend to child's health needs when they are occupied in livelihood generation activities(5, 20).

2.6.6 Number of Children

A study expressed in the literature as lots of children and infants in one family was a factor for parent refusal of child vaccinations(74). There is also another evidence that when the number of the family increased, the odd ration decreased, indicating that complete immunization is less likely to happen (75).

2.6.7 Birth Order

A study that conducted in Belgium among under one year old children found out that being a first child was a significant and positive predictor that associated for all complete vaccines and complete schedules (76). Immunization studies among infants from Israel and Pakistan also mentioned that child's birth order were independent risk markers and the children with higher birth order (> 7) were more likely to be incompletely immunized (74.4%) compared to the other children(12, 77).

2.6.8 Health beliefs: knowledge and attitude of caregiver towards immunization

Mother's perception to accessibility of vaccines and knowledge to vaccine preventable diseases and immunization schedule of their site were independent predictors of children immunization status. The perception of their children's health as precarious made some mothers extremely averse to causing them unnecessary pain and suffering (6, 20, 56).

2.6.9 Health Knowledge and behavioral towards additional Vaccine Preventable Diseases

A study in Mosul, Iraq mentioned that there was a significant association between immunization completeness with total knowledge and practice groups ($p < 0.05$). A higher percentage of caregivers with satisfactory knowledge and practice were found for children with full immunization (71.7%) and incomplete immunization (59.5) than other groups (78).

2.6.10 Distance, cost and time to have immunization

A study conducted in Bangladesh showed that children living in communities where outreach clinics were farther than 2 miles that consume more time to reach to the immunization center were 30 percent less likely to be immunized than children living in communities where outreach clinics were within 2 miles(26).A study did in Lusaka, Zambia, using Geographic Information System methods also mentioned that further distance from service points was associated with a significant reduction in uptake of DTP3 and measles vaccine, but that the effect of this could be reduced by the provision of outreach services into underserved areas(69).

A study in rural Guinea-Bissau mentioned that the coverage was lower, and children were taken fewer times for measles vaccine among those living >5 km from a health facilities than among children living within a 2 km radius ($P < 0.01$) (54). Incomplete immunization is also commonly linked to weaknesses in the health systems, such as poor service arrangements with long waiting time, inconvenient schedules, unwelcoming health care environment, and not holding sessions as planned (51). Negative experiences in health care facility and a perception that their health is

afforded a low priority confirmed through the paucity of engagement with this community, played a significant position in some mothers' refusal to engage with vaccination programs(56).

2.6.11 Utilization of health service (ANC and place of delivery)

In slum communities, home deliveries (often done by unskilled birth attendants) and neglect of childhood immunization is often the common practice. Also the birth registration system in urban slums is relatively weak and it is one of the barriers for (complete) immunization among the slum children(5, 20). The study discovered that the children who had been delivered at homes were less to be fully immunized than those who had been born in health care institutions. 13% of children who had been delivered in health centers were not fully immunized as compared with 32.5% of children delivered home. When the delivery is done in health institution , the child could start taking some vaccines and mothers could be informed about vaccines and when and where to return for next immunization (6).

The studies from in Mozambique, India and Bangladesh also showed utilization of maternal health care service like ANC, tetanus toxoid vaccination is associated with complete immunization status of children(41). A study from stated that 88% of women made their decision about their child's vaccination antenatal and that there was strong association (h = 0.87) between antenatal intentions and vaccination action (38). A study from Bangladesh found that 70.9% mothers who received sufficient antenatal care fully immunized their children, compared to 55.0% of mothers who did not receive antenatal care (60).

2.6.12 Health volunteer, Community & health staff and Family support (Receiving information prior to immunization from community /health volunteers)

It is important that caregivers are directed to accurate information so that they can make informed decisions regarding vaccination of their child population(79). Evidence from southern Ethiopia mentioned that poor immunization status in urban areas is related with mother's unawareness about repeat visits to achieve full immunization rather than overall vaccine awareness(6).

A study in Southern Ethiopia revealed that the main reason for defaulting from the immunization was inadequate counseling of caregivers from their environments that led to a lack of information about vaccination schedules and service arrangements, including in extraordinary circumstances such as after missed appointment (51).

A previous study in Myanmar found out that the volunteer help was a strongest predictor of the child immunization status with the significant value. In the study, there was almost 30% incomplete immunization with volunteer's help and 11% partially immunized without volunteer help. There was 3 times to be partially immunized with the volunteer's existence(20).

2.7 Previous studies in Myanmar

A few studies to assess the factors influencing on childhood immunization were conducted in different parts of Myanmar. A recent study which was done by Dr. Sein Lei Than in hill tribe region of Shan State in 2015 found out that one-fourth 25.8% had incomplete immunization and 74.2% had complete immunization among the children in the area . Child mother's occupation, perception, place of vaccination and the person sent for vaccination were significantly associated with incomplete immunization. The health volunteer and health system support such as volunteer help towards immunization program was the most important factors to the utilization of complete childhood immunization(20).

This study is required to be conducted because there was no other similar study conducted in slum area of Myanmar to understand the predictors of utilization of immunization service among the caregivers with under 3years old children and measure the level of complete immunization coverage in urban slum community. The objective of this study is not only to identify the factors associated with utilization of immunization service among under 3years old slum children but also to measure the prevalence of complete immunization status in the slum area and to generate health information to support health policy makers for better planning and strengthening of health care services for vulnerable children from informal setting.

2.8 Summary

Several lessons have been learnt on significant factors affecting utilization of immunization services in different settings from this literature review.

The first lesson from the literature review is that significant disparities in health outcomes exist in slum environments, with other places. For instance, migration and mobile community drive inequality in immunization coverage; the children from new migrant slum settings are likely to have lower immunization coverage than those who have been settled in urban or rural areas.

The second lesson is that in developing countries, the socio-demographic characteristics being poor decrease the utilization of immunization services among the caregivers. It mostly occurs in the households with low income, mothers with poor education, knowledge and perception.

The third lesson is that enabling factors such as availability and accessibility of the health service play an important role to childhood immunization coverage. According to the studies, the coverage was lower among children those living >5 km from a health facilities than among children living within a 2 km radius. Incomplete immunization is also usually associated to weaknesses in the health systems, such as poor service provision with long waiting time, inconvenient schedules, unwelcoming health care environment, and not holding sessions as planned.

Lastly, utilization of childhood immunization is affected not only by individual and family support but also by community, health volunteer and health system support. In the most recent study in Myanmar, health volunteer help was the strongest predictor associated with complete immunization.

CHAPTER III
RESEARCH METHODOLOGY

3.1 Study design

This study was cross-sectional descriptive study and it was based on community household survey in urban slum area of Chanmyathazi Township, Mandalay, Myanmar.

3.2 Study area

The study was conducted in an urban slum setting of one of the townships of Mandalay district; Chanmyathazi township that has the largest slum population in the district.

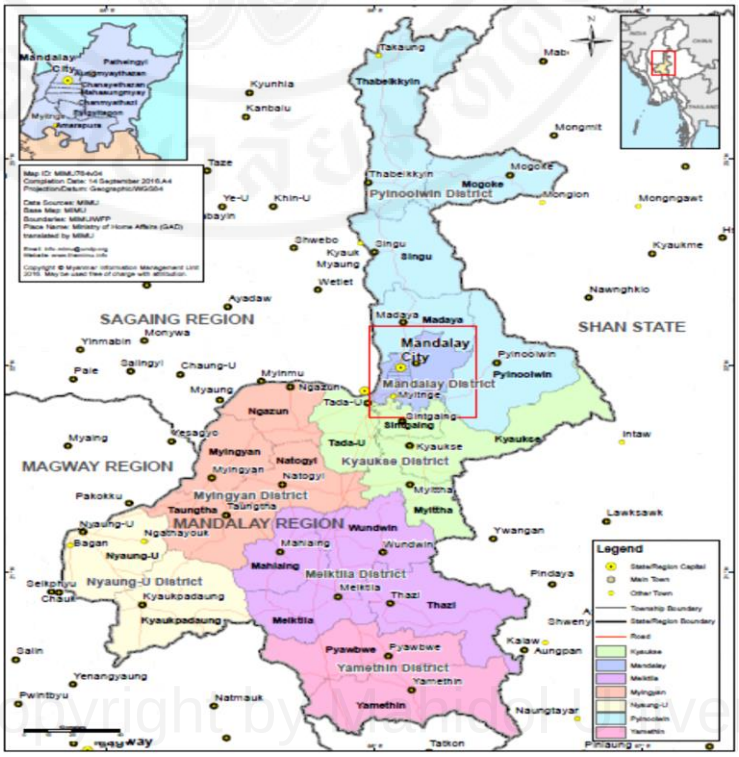


Figure 1.4 Mandalay city in Mandalay Region, Myanmar

Source: http://www.themimu.info/

3.3 Study Population

The study population was the caregivers with under 3years old children in slum area of Chanmyathazi Township, Mandalay district, Myanmar. Child's primary caregiver was chosen because many young children are not mainly looked after by only their biological mothers and the child's health is but also influenced by the other family members. Infants and young children frequently have key caregivers such as fathers, grandmothers, siblings or other relatives. They participate actively in the care of children(80).

3.3.1 Inclusion criteria

1) Primary child caregivers (aged 18 years or older) with who agreed to participate in the study.

2) Primary caregivers (aged 18 years or older) with under 3years old children.

3) The youngest child if the family had more than one under 3years old child.

3.3.2 Exclusion criteria

1) Caregiver who were physically or mentally ill

2) Caregivers with children with convulsions or CNS disorders or with immunosuppressive drugs or steroids.

3.4 Sample Size determination

The estimated sample size was calculated by the following formula, (81)

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Z^2 = standard normal deviation set as 1.96 corresponding 95% confidence interval

Q = 1-P

P = 0.5 (as the study was in slum where the prevalence of complete immunization was unknown)

$$n = \frac{(1.96)^2 * 0.5 * 0.5}{(0.05)^2}$$

$$= \frac{0.9604}{0.0025}$$

= 384 ±10%

= 422 (estimated sample size)

According to the results from the formula, total estimated sample size was 422 caregivers with under 3years old children from the study area. The researcher collected the study information from all 429 caregivers with under 3years old children as the whole study population in the area was small. However, questionnaires from 77 respondents had to take out for data analysis because of incomplete information.

3.5 Sampling technique

The study area; Chanmyathazi Township, Mandalay is located in central Myanmar. The population density of Mandalay Region in March 2014 was 200 persons per square kilometers which is much higher than the Union level population density of 76 persons per square kilometers. It means Mandalay is the second most densely populated Region in Myanmar and it has the third largest urban population after Yangon Region (70 percent) and Kachin State (36 percent).The Infant Mortality Rate IMR for Mandalay Region is 57 per 1,000 live births, and under-5 Mortality Rate is 66 deaths per 1,000 live births(82).

Mandalay region is composed with 7 districts. Mandalay district which is one of the districts in the region has 7 townships; Aungmyetharzan, Chanayetharzan, Mahaaungmye, Chanmyatharzi, Pyigyidagun, Amarapura and Patheingyi. Among them, three townships; Chanmyatharzi, Amarapura and Pyigyidagun are with slum population. The study township; Chanmyathazi Township is with largest slum population with highest number of children compare to other townships. In the township, Than Lyat Maw (west) quarter which had slum population of 7428, under Ayeyartun Urban Health Center area was chosen by cluster sampling because this

cluster only had slum settings and other urban health centers covered urban city areas. To reduce selection bias and because of the small study population, all 429 households with under 3years old children from five clusters in the area were included in the study.

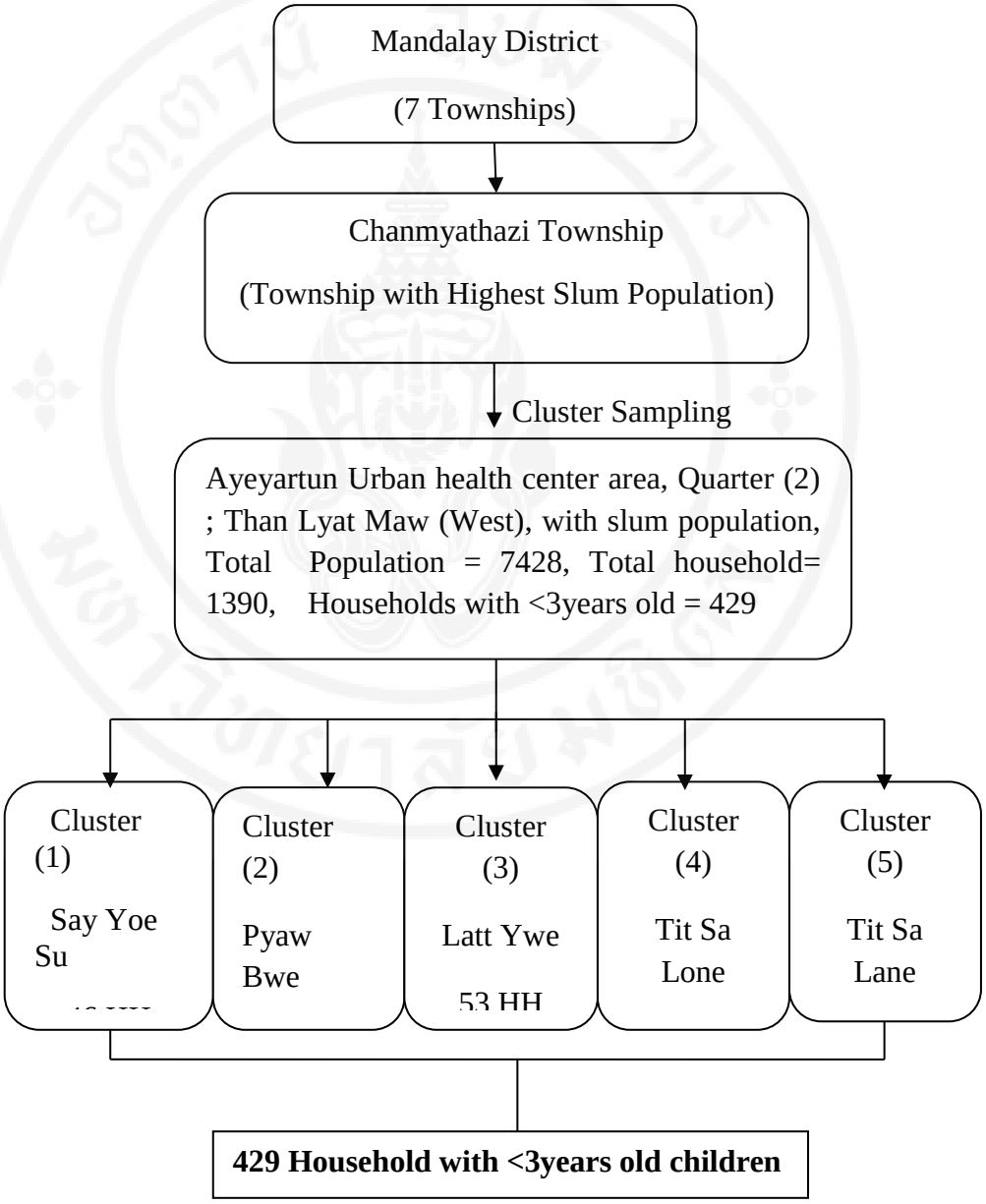


Figure 1.5 Sampling Frame

3.6 Research instrument

The research instruments was structured questionnaires which composed of the factors associated with immunization status among caretakers with under 3years old children. The questionnaires were divided into four parts.

Part I: Predisposing Factors; Socio-demographic characteristics of caregivers and health beliefs.

Gender of the caregivers was classified into Male and Female.

Caregiver's age and child's age was collected in form of continuous data during the data collection. Then, the continuous data was categorized into two groups based on median ages.

Caregiver relationship to child was collected with four groups; mother, father, grandparents and others. Later it was categorized into parent and non-parent variable and mother, father and other variable.

Religion was classified into Buddhist, Christian, Hindu, Muslim and others. Then, it was grouped into Buddhist and Non-Buddhist during the data analysis.

Education level was defined into five groups; illiterate, primary school, secondary school, high school, collage / University . Later it was grouped into low (illiterate, primary, secondary and high school) and high education (above high school).

Migration was assessed if the household stayed in the area permanently or had it moved to the area from other place during the last year. The data was collected in years in forms of continuous data and then it was group into migration status yes (moved in last 12 months) and migration status no for analysis.

Household income was collected in form of continuous data in Myanmar Kyat. Then, the variable was grouped into two groups based on the median cut point (200,000MMK). The two groups were low family income whose income is lower than 200,000MMK whereas high family income whose income is equal or greater than 200,000MMK.

Occupation status was initially typed into 5 groups; self-employed, daily worker, housewife, civil servants and others. Later, it was re-organized into four groups; self-employed, daily worker, housewife and others.

Number of children in the family was collected in form of continuous data during the data collection. Then, the continuous data was categorized into two groups with median cut point; <2 children and ≥2 children.

Birth order was collected as continuous data during the data collection and then it was grouped into two <2nd birth order and ≥2nd birth order using median cut point.

Knowledge towards immunization, this part was contained 11 questions to access the knowledge of the caregivers on immunization program. The questions were about the transmission of vaccine preventable diseases, types and timing of vaccine, symptoms and adverse action of vaccination. The questions was formed as Yes, No and Not sure. Making the correct to a question was rated '1' and making an incorrect answer was rated as '0'. The level of the knowledge was determined into 3 categories according to Blooms' criteria. The good knowledge group was with above 80% of the score, moderate knowledge group was within 60%-80% of the score and poor knowledge group was with less than 60% of the score.

Perception towards immunization, this part was contained 12 questions to identify the perception of caregivers towards immunization. It was comprised with perceived benefit, perceived severity, perceived susceptibility and perceived barrier to immunization. The questions were answered by using Likert scale strongly agree, agree, neutral, disagree and strongly disagree. The score was given for positive statements as ; "strongly agree" 5 points, "agree" 4 points, "neutral" 3 points, "disagree" 2points and "strongly disagree" 1 point. The negative statements were given scoring vice versa. Then the caregiver's perception was grouped into three categories; low, moderate and high according to tertiles obtained.

Health Knowledge and behavioral towards additional Vaccine Preventable Diseases was contained 8 questions regarding knowledge and behavioral of additional vaccine preventable diseases. The questions were formed as Yes, No and Not sure. Making the correct to a question was rated '1' and making an incorrect answer was rated as '0'. The level of the knowledge was determined into 2 categories with median cut point. The good knowledge group was with equal or median score and poor group was with less than median score. The health center where they received additional vaccines was categorized into two places: government and private.

The cost was collected in Myanmar Kyat and later it was grouped into two groups; with cost and free of charge.

Part II Enabling factors: accessibility/ availability and utilization of health service. This part was contained 11 questions to assess the Accessibility/ Availability and previous utilization of health service.

Time to reach immunization center, this part was contained questions about where did they go for immunization, how they went, how far, how long it took and how much they had to spend of vaccination for transport and service.

Places of immunization was categorized into 4 places; Urban health center, hospital, private clinic/ hospital and other. And it was regrouped into government center and community centers for analysis. Mean of transport was grouped into 4; walk, motorbike, bicycle/trishaw and others and it was reorganized into walking and non-walking later. If they had to spend for the transport charges, the cost was collected in continuous data in Kyat and later they were categorized into no cost and with cost. Time consumptions for the travel was calculated in minutes and later it was categorized into less than ≤15 minutes and >15 minutes. Distance from home to the immunization center was categorized into two groups; <2 km and ≥ 2km.

Frequency of ANC visit was accessed and later it was grouped into two groups of <4 visits and ≥ 4 visits.

Place of delivery was contained questions about where was the child borne (home or government health center or other), by who (health staffs or non-health staff). Delivery place was categorized initially into government hospital/health center, home, private clinic/hospital and others. It was regrouped into 2; at home and at health facility for analysis.

Performance of the delivery was classified by doctor, midwife and nurses, birth attendant and others. Then, during the data analysis, four groups were reorganized into three categories of Doctor, MW/Nurses and others (non-skill birth attendant).

Receiving of the information about immunization after delivery was grouped into two: Yes and No that includes both No and Not sure.

Part III Reinforcing Factors: Health volunteers, Community & Health staff and Family support

Receiving information of immunization, this part was comprised with 3 questions about how, where and when the information came from for their child to be vaccinated. Receiving immunization information was organized into two groups; Yes and No.

Source of information was grouped into health worker, volunteer, neighbours and others. Later they were grouped into health worker/volunteer and community member for data analysis. The time of receiving information was categorized into one week before, 3days before, 2 days before and other. Late it was be regrouped into three groups: at immunization day, 1-3 days before and other (weeks or months in advance).

This part also contained two questions if they had good health service and care from the health staffs and support and advice from their family/community regarding immunization. The variables were categorized into two groups: Yes and No that include No and Not sure.

Part IV Utilization of immunization programs

This part was contained 15 questions to access the immunization completeness of children and the timely administration of appropriate immunization. It was accessed the immunization of child by using immunization card from the caregiver and from the health facility.

3.7 Data collection

The data collection was carried out according to the following procedures.

1) The research proposal was submitted to Ethical Review Committee of Mahidol University to obtain the approval.

2) After that, local health authority (district and township health department) and local government from Myanmar were contacted and explained the purpose and benefits of the study and to collect the data which was the name lists of the household where under 3years old children lived in the area for choosing respondents.

3) And then, the research questions were translated from English to Myanmar language. 3 research assistants who could speck local language were trained to participate in the study.

4) The study was community household survey and data was collected by face to face interview using structured questionnaires. The interview took approximately 20 minutes. All the respondents with under 3children who agreed to participate in the study were included. The questions were explained to the respondents by using the simplest terms under the supervision of researcher. The record of immunization card checking was done by researcher and research assistants.

5) Lastly, the children's immunization status was countered checked by health facility records.

3.8 Validity and Reliability

3.8.1 Validity

Validity of the questionnaires was created and revised by reference books and theoretical background. The structured research questionnaires were checked by thesis advisors and experts to verify content validity and it was approved by thesis advisory committees before the start of data collection.

3.8.2 Reliability

Pretest was conducted to 10% of the sample size in the similar context. Other additional editing to questionnaires was done according to the comments and response from the sample caregivers. In order to reduce communication gap between respondents and researchers, the questionnaires were translated from English to Myanmar language. Face to face interview was conducted to reduce the information bias. Kuder- Richardson Formula (KR 21) was used to calculate the reliability of the instrument and Cronbach's alpha coefficient for knowledge and perception respectively. The result of KR21 was 0.689.

3.9 Statistical Analysis

Data analysis was done with SPSS 21 (Statistical Package for Social Science) software. Before data entry, raw data was checked for consistency and missing information. Then data coding and verification were done.

1) Descriptive statistics was used to compute mean, median, standard deviation, quartile deviation for the quantitative and frequency & percentage for the qualitative.

2) Inferential statistics: Bivariate analysis was used to access the association between predisposing factors, enabling factors, reinforcing factors, knowledge & behavioral towards additional vaccine preventable diseases and immunization status (utilization of immunization service, timeliness and immunization with timeliness) by Chi-square test.COR was used to show the association with P-value and 95%CI.

3) Multiple Logistic Regression: Lastly, the factors with strong evidence supported by previous studies and those with significant P-value <0.25 were analyzed by Multiple logistic regressions. Backward Wald was used to discover the predictors of the model by adjusting confounding factors. AOR was used to show the association with P-value and 95%CI.

3.10 Ethical considerations

The study was conducted under the approval of Ethical Committee from faculty of Graduate Studies, Mahidol University. Both written form and verbal consent was taken for ethical considerations. The study interview was taken only with agreement of the respondents and the participants were allowed to withdrawal anytime during the process of survey.

CHAPTER IV
RESULTS

The aim of the study was to identify factors associated with immunization status among under 3years old children in urban slums of Mandalay region, Myanmar. This study was conducted by face to face interview with caregivers who had under 3years old children in urban slums of Chanmyathazi Township, Mandalay, Myanmar during April to May 2017. Total 429 respondents participated in the study. Among them, information regarding immunization service utilization of 77 respondents could not be confirmed because the caregivers did not have vaccination cards and the children's data was not in respective health facility record in order to perform countercheck. That is why 352 questionnaires were included for Chi-square test and multiple logistic regressions analysis. The results were summarized in frequency, percentage, mean, median, QD, SD, minimum, and maximum. Chi-square tests were performed to examine the association between independent variables and immunization status. Further, multiple logistic regressions were presented to determine the most predictor factors to the immunization. The research results are presented as follows:

4.1 Socio-demographic characteristics

4.2 Knowledge and Perception towards immunization

4.3 Knowledge & Behavioral towards additional Vaccine Preventable Diseases

4.4 Accessibility and Availability factors

4.5 Utilization of health care service

4.6 Reinforcing factors toward immunization

4.7 Immunization status

4.8 Association between independent variables and immunization

4.9 Predictive factors for immunization

4.1 Socio-demographic characteristics

The socio-demographic characteristics include caregiver age, child age, caregiver gender, relationship to child, religion, education, migration, household income, occupation, number of children and birth order. Less than half of the caregivers (49.4%) were less than median age; 31 years old and more than half of them (50.6%) were more than or equal 31years old (QR=5.5). Nearly half of the children (49.2%) were less than 18 months with QR was 0.5. Majority of the respondents (90.7%) were female while male respondents were with (9.3%). More than half of the respondents (77.4%) were mothers and the rest were grandparents (9.8%), fathers (7.5%) and others (5.4%). Majority of the respondents (99.1%) were Buddhists and followed by Hindu and Muslim (0.9%).

In terms of caregiver education, 43.6% of the respondents were with below and primary education while middle and high school were with 42.7% and above high school were with 13.8% respectively. Regarding the caregivers' occupation, majorities (46.4%) were housewives, and others were self-employed (21.4%), civil servant and factory worker (21%) and daily workers (11.2%). With regards to monthly household income, more than half of the respondents (63.6%) had equal or more than 200,000 Myanmar Kyat (200USD), whereas the others (33.8%) had below 200,000 Kyat (200USD).

Most of the total respondents (79.3%) were staying in the area more than last 12 months, while nearly 20% of them were moved during that period. The migration status was different between two groups; 352 respondents who had immunization status information and 77 who had neither immunization card nor included in health center record when the data was analyzed separately. In 352 respondents group, more than half of them (78.1%) did not have migration status whereas 72% of the other group with 77 respondents moved to the area within 12 months.

The percentage of family with equal to or more than 2 children is (57.1%) and the remainder was (42.9%) with less than 2 children. In terms of child birth order, more than half of the children (55%) were with 2nd or above birth order whereas the residues (45%) were first child.

Table 4.1 Number and percentage of respondents by social-demographic factors

Socio-demographic characteristics	Number (n= 429)	Percentage (%)
Caregiver Gender		
Male	40	9.3
Female	389	90.7
Caregiver age group		
<31 years	212	49.4
≥31 years	217	50.6
Median (QD) = 31(5.5), Min = 18, Max = 86		
Child age group		
<18 months	211	49.2
≥ 18 months	218	50.8
Median (QD) = 18 (9), Min = 1, Max = 36		
Relationship to the child		
Mother	332	77.4
Father	32	7.5
Grandparents	42	9.8
Other	23	5.4
Religion		
Buddhist	425	99.1
Others (Hindu, Muslim)	4	0.9
Education		
Illiteracy	31	7.2
Primary	156	36.4
Secondary	101	23.5
High	82	19.1
Collage/University	59	13.8

Table 4.1 Number and percentage of respondents by social-demographic factors (cont.)

Socio-demographic characteristics	Number (n= 429)	Percentage (%)
Education Level		
Primary and below	187	43.6
Middle and High school	183	42.7
Collage/University and above	59	13.8
Occupation		
Self-employed	92	21.4
Daily-worker	48	11.2
Housewife	199	46.4
Other (civil servant, factory worker, etc)	90	21.0
Income (n= 418*)		
< 200,000	145	34.7
≥ 200,000	273	65.3
Median (QD) = 200,000 Kyats (75,000) , Min= 60,000Kyats , Max= 1,000,000Kyats		
Migration		
Moved in last 12 months	89	20.7
Stayed more than 12 months	340	79.3
Median (QD) = 7years (9years), Min = 1month, Max= 62years		
Migration (n=352)		
Moved in last 12 months	77	21.9
Stayed more than 12 months	275	78.1
Migration (n=77)		
Moved in last 12 months	56	72.7
Stayed more than 12 months	21	27.3
Number of children in family		
<2 children	184	42.9
≥2 children	245	57.1
Median (QD) = 2 (1) ,Min= 1, Max= 10		

Table 4.1 Number and percentage of respondents by social-demographic factors (cont.)

Socio-demographic characteristics	Number (n= 429)	Percentage (%)
Child Birth Order		
<2nd child	193	45.0
≥ 2nd child	236	55.0
Median(QD) = 2 (1), Min = 1st , Max= 10th		

*missing 11cases

4.2 Knowledge and Perception towards immunization

Nearly two-thirds of the caregivers (61.3%) were with fair knowledge level towards childhood immunization, symptoms of vaccine preventable diseases, mode of transmissions. And the rest respondents had poor (19.3%) and good knowledge level (19.3%) respectively.

As shown in table 4.2, the greater number of caregivers (62.5%) was with moderate perception that composed of disease susceptibility, severity, benefits and barriers to service utilization (see in Appendix) while the respondents with low and high perception were (17.7%) and (19.8%).

Table 4.2 Number and percentage for level of knowledge and perception towards immunization

Knowledge level	Number (n= 429)	Percentage (%)
Poor <60%	83	19.3
Fair 60-80%	263	61.3
Good >80%	83	19.3
Knowledge Score Median (QD) = 2 (1), Min= 1 , Max= 11		

Table 4.2 Number and percentage for level of knowledge and perception towards immunization (cont.)

Perception level	**Number (n= 429)**	**Percentage (%)**
Low (< 42 score)	76	17.7
Moderate (43- 52 score)	268	62.5
High (> 53 score)	85	19.8
Perception Score Median (QD) =48 (4),), Min= 33, Max= 60		

4. 3. Knowledge and Behavioral towards additional Vaccine Preventable Diseases

There were nearly half of the respondents (52.7%) with low knowledge towards additional vaccine preventable diseases such as Japanese Encephalitis, Rota virus and Hepatitis B. Concerning about having experience of seeing children with those diseases, only a few respondents (10.5%) answered positively to Hepatitis B virus infection. In terms of receiving additional vaccines, some caregivers (14.5%) responded that they had their children Hepatitis B vaccines in both government hospitals (61.3%) and private hospital (38.7%). Among them, 41.9% of the respondents received the vaccines with free of charge, (45.2%) with low cost and (12.9%) with high cost.

Table 4.3 Number and percentage of respondents' knowledge and behavioral towards additional Vaccine Preventable Diseases

Knowledge	**Number (n= 429)**	**Percentage (%)**
Low	226	52.7
High	203	47.3

Table 4.3 Number and percentage of respondents' knowledge and behavioral towards additional Vaccine Preventable Diseases (cont.)

Do you see children with one of those diseases in your neighbor?	**Number (n= 429)**	**Percentage (%)**
No, Not sure	384	89.5
Yes	45	10.5
Did your child receive those vaccines (JE, Rota, Hep B)?	**Number (n= 429)**	**Percentage (%)**
No, Not sure (Negative answer)	367	85.5
Yes (Positive answer)	62	14.5
Vaccination Place (n= 62)	**Number**	**Percentage (%)**
Government health center (Hospital, Urban Health Center)	38	61.3
Private health center (Hospital, Clinic)	24	38.7
Vaccination Cost (n= 62)	**Number**	**Percentage (%)**
Free of charge	26	41.9
Low cost ≤ 20,000MMK (20USD)	28	45.2
High cost > 20,000MMK (20USD)	8	12.9
Min cost= 3,500 MMK (35USD), Max cost= 180,000MMK (180USD)		

4.4 Accessibility and Availability factors

In terms of accessibility and availability factors, the respondents were asked place of routine vaccination, distance, mode of transport, transport cost, travel time, vaccination cost and waiting time in immunization center. 388 respondents who had routine immunization service answered to those questionnaires. Regarding the place of vaccination, more than half of the caregivers (55.4%) received routine immunization at government health centers such as urban health center and hospital while other (44.6%) brought the children to community centers during health staffs monthly visits. Majority of the respondents (83.8%) had less than 2km distance to

reach to the immunization sites. The most caregivers (86.6%) walked and it took equal or less than 15 minutes to the immunization places for (85.6%) of the total respondents. (98.2%) of the total respondents did not cost transport charges. All the respondents (100%) received the routine vaccination with free of charge. About two third of the respondents (69.3%) had to wait equal or less than 15 minutes in the vaccination places.

Table 4.4 Number and percentage of enabling factors, accessibility & availability factors

Accessibility and Availability factors	Number (n= 388)	Percentage (%)
Routine immunization place		
Government health centers (Urban health center, hospital)	215	55.4
Community center (School, Monastery, etc)	173	44.6
Distance		
<2 Kilometers	325	83.8
≥2 Kilometers	63	16.2
Types of Transportation		
Walk	336	86.6
Non-walking	52	13.4
Transportation cost		
No cost	381	98.2
cost transportation fees	7	1.8
Travel Time		
≤15 mins	332	85.6
>15 mins	56	14.4
Vaccination Cost		
Free of charge	388	100
Waiting Time for immunization		
≤15 mins	269	69.3
>15 mins	119	30.7

4.5 Utilization of health care service

Considering antenatal care visits, almost two-third of the respondents (68.5%) replied that the children's mothers received standard antenatal care visits; 4 times or above. Likewise 61.5% of the children were delivered in health facilities by health personal while more than one-third of the children (38.5%) were born at home. Nearly 90% of the deliveries were done by skill birth attendants; doctors (56.4%) and Midwife/Nurse (34%) whereas the rest (9.6%) were delivered with birth attendants or auxiliary midwives. Concerning the information given by health workers after delivery, the vast majority (66.2%) had the information when (33.8%) of the respondents answered that they did not have any information as shown in table 4.5.

Table 4.5 Number and percentage of enabling factors, utilization of health service

Utilization of Health Service	Number (n= 429)	Percentage (%)
ANC visit		
<4 visits	135	31.5
≥4 visits	294	68.5
Child Delivery Place		
At home	165	38.5
Health Facility (Gov & Private)	264	61.5
Person assisted delivery		
Doctor	242	56.4
Midwife/Nurses	146	34.0
Other(AMW, birth attendant)	41	9.6
Receiving immunization information after delivery		
Yes	284	66.2
No, Not sure	145	33.8

4.6 Reinforcing factors toward immunization

In terms of reinforcing factors, majority of the respondents (98.8%) responded that they received information about monthly routine immunization.

Among those respondents, (45%) were informed by health volunteer, (28%) by community members, (21.9%) by health worker and (5%) by their neighbors. The respondents answered that they were notified at immunization day (43.2%) and 1-3days before (48.8%) as well as weeks or months in advance (8%). Regarding health care service during vaccination, most caregivers (98.2%) answered that they had good health care while a few (1.8%) replied negatively. Concerning family and social support to immunization utilization, more than half of the caregivers (85.1%) responded that they felt supported while the remainders (14.9%) answered no.

Table 4.6 Number and percentage of reinforcing factors

Reinforcing Factors	Number (n= 429)	Percentage (%)
Receiving information		
Yes	424	98.8
No	5	1.2
Person given information (n=424)		
Health Worker	93	21.9
Health Volunteer	191	45.0
Neighbor	21	5.0
Community Leader/ Facilitator	119	28.1
Time receiving information (n=424)		
At immunization day	183	43.2
1-3 days before	207	48.8
Other (week or month in advance)	34	8.0
Having good health care during immunization (n= 388*)		
Yes	381	98.2
No, Not sure	7	1.8
Family or Social support		
Yes	365	85.1
No, not sure	64	14.9

*missing 41 cases

4.7 Immunization status

There were total 352 children who their immunization status could be confirmed by either cards (59.1%) or health facility records (40.9%). Among 352 children, (24.1%) were with full immunization and (64.8%) were partial according to national schedule regardless of timeliness, whereas (11.1%) of them were never immunized. In partial group, more than half of the children (65.8%) were with lack of one or more vaccinations apart from Polio injection (IPV) from the national schedule while the rest were partial because of no Polio injection (IPV). Polio injection has been introduced by Ministry of Health and Sport in early 2016 and the vaccine has been shortage in the study area in October 2016. In terms of completion of type of immunization, (24.1%) had completed all type of EPI vaccines and other (75.9%) had Partial and no types of immunization at all regardless of timeliness. Regarding timeliness of the vaccination without considering full or partial immunization, (26.5%) of the immunized children had the vaccines with correct timeliness, while about three-fourth (73.5%) of those did not have timeliness. In terms of utilization of immunization service, (23%) of the child' caregiver had utilized the service while (77%) of them did not use it as shown in Table 4.7.

Table 4.7 Number and percentage of immunization status

Status	Number (n=352)	Percentage (%)
Immunization Status		
Full	85	24.1
Partial	228	64.8
Not immunized at all	39	11.1
Type of immunization (Outcome 1)		
Yes (complete)	85	24.1
No (incomplete + Not at all)	267	75.9
Timeliness (Outcome 2) (n= 313)		
Yes (Full or Partial with timeliness)	83	26.5
No (Full or Partial without timeliness)	230	73.5

Table 4.7 Number and percentage of immunization status (cont.)

Status	Number (n=352)	Percentage (%)
Utilization of immunization service (Outcome 3) (n= 313)		
Yes (full with timeliness)	72	23
No (full with no timeliness & Partial with/without timeliness)	241	77
Immunization Card		
Yes	208	59.1
No	144	40.9

4.8 Association between the immunization status and independent variables

There were three outcomes from the study. They were (1) Types of immunization, (2) Timeliness and (3) Utilization of immunization service. The outcome measure (1) Type of immunization was composed with Yes (complete) and No (incomplete & No immunization) regardless of timeliness. The outcome (2) Timeliness was examined with immunized group without considering completion (full or partial) of the immunization. The last outcome (3) Utilization of immunization service was made with Yes (23%) who had compete vaccination with timeliness and No (77%) who had no quality immunization.

Association between independent variables and three outcomes were analyzed by using Chi-square test and multiple logistic regressions to detect the association.

4.8.1 Association between predisposing factors and Type of immunization

Table 4.8 Association between predisposing factors and type of immunization

Socio-demographic characteristics							
Factors	**Total Sample**	**Type of immunization**				**Crude OR 95% CI**	**P-value**
		Yes		**No**			
		n	**(%)**	**n**	**(%)**		
Gender	**352**						
Male	33	3	9.1	30	90.9	3.460 (1.209-11.639)	**0.045***
Female	319	82	25.7	237	74.3	1	
Caregiver age	**352**						
< 31years	173	47	27.2	126	72.8	1	
≥ 31 years	179	38	21.2	141	78.8	1.384 (0.848-2.260)	0.194
Child age	**352**						
< 18 months	188	64	34	124	66	1	
≥ 18 months	164	21	12.8	143	87.2	3.515 (2.031-6.082)	**<0.001*****
Relationship	**352**						
Mother	280	78	27.9	202	72.1	1	
Father	26	3	11.5	23	88.5	2.960 (0.864-10.140)	0.084
Others	46	4	8.7	42	91.3	4.054 (1.407-11.683)	**0.010****
Religion	**352**						
Buddhist	349	85	24.4	264	75.6	1	
Non-Buddhist	3	0	0	3	100	1.384 (0.848-2.260)	0.194

Table 4.8 Association between predisposing factors and type of immunization (cont.)

Socio-demographic characteristics							
Factors	**Total Sample**	**Type of immunization**				**Crude OR 95% CI**	**P-value**
		Yes		**No**			
		n	**(%)**	**n**	**(%)**		
Education	**352**						
Low education	300	66	22	234	78	2.041 (1.090-3.822)	**0.026***
High education	52	19	36.5	33	63.5	1	
Occupation	**352**						
Self-employed	76	9	11.8	67	88.2	3.030 (1.395-6.582)	**0.005****
Daily-worker	43	8	18.6	35	81.4	1.781 (0.768-4.130)	0.179
Housewife	159	46	28.9	113	71.1	1	
Others	74	22	29.7	52	70.3	0.962 (0.525-1.762)	0.901
Income	**344**						
< 200,000	128	6	4.7	122	95.3	11.725 (4.936-27.850)	**<0.001*****
≥200,000	216	79	36.6	137	63.4	1	
Migration	**352**						
Yes	76	6	7.9	70	92.1	4.679 (1.953-11.208)	**<0.001*****
No	276	79	28.6	197	71.4	1	
Child number	**352**						
< 2 children	147	46	31.3	101	68.7	1	
≥2 children	205	39	19	166	81	1.939 (1.184-3.174)	**0.009****

Table 4.8 Association between predisposing factors and type of immunization (cont.)

Health Beliefs							
Factors	**Total Sample**	**Type of immunization**				**Crude OR 95% CI**	**P-value**
		Yes		**No**			
		n	**%**	n	**%**		
Birth Order	**352**						
< 2nd child	156	47	30.1	109	69.9	1	
≥2nd child	196	38	19.4	158	80.6	1.793 (1.096-2.933)	**0.020***
Knowledge	**352**						
Poor	71	11	15.5	60	84.5	1.783 (0.766-4.149)	0.179
Fair	212	57	26.9	155	73.1	0.889 (0.475-1.663)	0.713
Good	69	17	24.6	52	75.4	1	
Perception	**352**						
Low	62	11	17.7	51	82.3	1.076 (0.443-2.616)	0.871
Moderate	221	61	27.6	160	72.4	0.609 (0.311-1.192)	0.148
High	69	13	18.8	56	81.2	1	

***P-value <0.05, **P-value <0.01, *** P-value < 0.001**

As shown in table 4.8, caregiver age, religion, caregiver's knowledge and perception towards immunization were not related to type of immunization. In socio-demographic characteristics, caregiver's gender, child age, caregiver relation to child, education, occupation, income, migration, child number, birth order were significantly associated with type of immunization in Chi-square test. In terms of gender, male caregivers were 3.5 times likely not to complete all type of immunization than female caregivers. Regarding child age group, caregivers with children aged equal or above 18 months were 3.5 times likely to complete compare to other group with P-value <0.001. Mothers were more likely to complete type of immunization nearly 4 times compared to other caregiver such as grandparents and siblings.

Caregivers with low education were about 2 times likely to not to full type of vaccination than those with high education. Regarding occupation, caregivers who were working self-employment jobs were 3 times less likely to complete type of immunization compare with housewife caregivers. There was a significant association between household income and the outcome with P-value <0.001. Caregivers with low income were 11.7 times less likely to have type of immunization than caregivers from households with high income. Migration status was also related to type of immunization with P-value <0.01 between the caregivers who moved to the area within 12 months and who did not move. The child caregivers who had movements within 12months were 4.7 times less likely to have type of complete immunization compare with the other caregivers. Child numbers in the family and child birth order were also associated with this outcome. Caregivers with one child were 1.9 times more likely to have full type of immunization than those with two or more children. Similarity, caregivers with first birth children were 1.7 times more likely to have type of immunization than the others.

4.8.2 Association between knowledge and behavioral towards additional Vaccine Preventable Diseases and type of immunization

Regarding knowledge and behavioral towards additional vaccine preventable diseases, there was no significant association between the outcome and factors; knowledge, vaccination places and cost apart from with receiving additional vaccines before. The caregivers with children who had additional vaccines such as Hepatitis B were 17 times more likely to have type of immunization than the caregivers with no vaccinated children with significant P-value <0.001.

Table 4.9 Association between knowledge and behavioral towards additional Vaccine Preventable Diseases and type of immunization

Factors	Total Sample	Type of immunization				Crude OR 95% CI	P-value
		Yes		No			
		n	%	n	%		
Knowledge	**352**						
Low	183	43	23.5	140	76.5	1.077 (0.661-1.755)	0.767
High	169	42	24.9	127	75.1	1	
Behavior							
Receiving additional vaccines (n=352)							
Yes	50	38	76	12	24	1	
No	302	47	15.6	255	84.4	17.181 (8.365-35.287)	**<0.001*** **
Vaccination place (n=50)							
Government health center	32	22	68.8	10	31.2	3.636 (0.699-18.918)	0.125
Private health center	18	16	88.9	2	11.1	1	
Cost (n=50)							
Free of charge	20	13	65	7	35	2.692 (0.713-10.170)	0.144
With cost	30	25	83.3	5	16.7	1	

***P-value <0.05, **P-value <0.01, *** P-value < 0.001**

4.8.3 Association between enabling factors and type of immunization

Table 4.10 Association between enabling factors and type of immunization

Accessibility and Availability							
Factors	**Total Sample**	**Type of immunization**				**Crude OR 95% CI**	**P-value**
		Yes		**No**			
		n	**(%)**	**n**	**(%)**		
Routine immunization place	**313**						
Government health center	174	44	25.3	130	74.7	1.236 (0.750-2.037)	0.406
Community center	139	41	29.5	98	70.5	1	
Distance	**313**						
<2kilo	269	75	27.9	194	72.1	1	
≥2kiol	44	10	22.7	34	77.3	1.314 (0.619-2.793)	0.477
Transport	**313**						
Walking	275	74	26.9	201	73.1	1.107 (0.523-2.343)	0.791
Non-walking	38	11	28.9	27	71.1	1	
Transport cost	**313**						
No cost	308	85	27.6	223	72.4	1	
With cost	5	0	0	5	100	6.158E8 (0.000-)	0.999
Travel time	**313**						
≤ 15 mins	273	75	27.5	198	72.5	1	
>15mins	40	10	25	30	75	1.136 (0.530-2.438)	0.743

Table 4.10 Association between enabling factors and type of immunization (cont.)

Factors	Total Sample	Type of immunization				Crude OR 95% CI	P-value
		Yes		No			
		n	(%)	n	(%)		
Accessibility and Availability							
Waiting time	**313**						
≤ 15 mins	**220**	65	29.5	155	70.5	1	
>15mins	93	20	21.5	73	78.5	1.531 (0.863-2.715)	0.146
Utilization of health service							
ANC visits	**352**						
<4 visits	112	18	16.1	94	83.9	10.534 (4.131-26.864)	**<0.001*** **
≤ 4 visits	240	67	27.9	173	72.1	1	
Delivery place	**352**						
At home	137	17	12.4	120	87.6	3.265 (1.822-5.853)	**<0.001*** **
Health Facility	215	68	31.6	147	68.4	1	
Delivered person	**352**						
Doctor	199	63	31.7	136	68.3	1	
Midwife/Nurses	121	19	15.7	102	84.3	2.487 (1.401-4.413)	**0.002****
Others (unskilled birth attendant)	32	3	9.4	29	90.6	4.478 (1.315-15.253)	**0.017***
Receiving Immunization information after delivery n= 352							
Yes	242	62	25.6	180	74.4	1	
No	110	23	20.9	87	79.1	1.303 (0.757-2.242)	0.339

***P-value <0.05, **P-value <0.01, *** P-value < 0.001**

As shown in table 4.10 below, immunization place, distance, transport, transport cost, travel and waiting time, receiving immunization information after delivery were not related to the type of immunization. There was no significant association between those factors and the type of immunization except mother's antenatal care visits, child delivery place and person assisted in delivery in Chi-square test. Concerning the antenatal care visits, the caregivers with children who had equal or more than 4 times ANC visits during pregnancy were 10.5 times more likely to full type of immunization compared to the other caregivers. Moreover, it was strongly significant between the delivery place and type of immunization with P-value <0.001. In terms of person assisted in delivery, if the child was delivered by unskilled birth attendants, the service utilization was 4.4 times less likely to used compare to the child who was delivered by doctor.

4.8.4 Association between reinforcing factors and type of immunization

Table 4.11 describes the relationship between reinforcing factors and type of immunization. There were significant associations between family/social support and having immunization card with the type of immunization. The child caregivers who did not have family/ social support were 2.6 times less likely to have all type of immunization than the caregivers received the support. Further, the respondents who had immunization cards were 5.9 times more likely to have all type of immunization than the caregivers who did not have child immunization cards with P-value <0.001. There was no significant association between the type of immunization and other reinforcing factors such as receiving information, source of information received, and time receiving information and having good health care during vaccination.

Table 4.11 Association between reinforcing factors and Type of immunization

Factors	Total Sample	Type of immunization				Crude OR 95% CI	P-value
		Yes		No			
		n	(%)	n	(%)		
Receiving routine immunization information (n=352)							
Yes	349	85	24.4	264	75.6	1	
No	3	0	0	3	100	5.201E8 (0.000-)	0.999
Information delivered by (n=349)							
Health worker/ volunteer	239	57	23.8	182	76.2	1.090 (0.647-1.838)	0.746
Community member	110	28	25.5	82	74.5	1	
Time receiving information(n=349)							
At immunization day	151	33	21.9	118	78.1	1.430 (0.578-3.540)	0.439
1-3 days before	170	44	25.9	126	74.1	1.145 (0.471-2.786)	0.765
Other (week or months in advance)	28	8	28.6	20	71.4	1	
Had good health service (n=313)							
Yes	308	84	27.3	224	72.7	1	
No	5	1	20	4	80	1.500 (0.165-13.614)	0.719
Family and social support (n=352)							
Yes	301	79	26.2	222	73.8	1	
No	51	6	11.8	45	88.2	2.669 (1.096-6.497)	**0.031***

Table 4.11 Association between reinforcing factors and Type of immunization (cont.)

Factors	Total Sample	Type of immunization				Crude OR 95% CI	P-value
		Yes		No			
		n	(%)	n	(%)		
Having immunization card (n=352)							
Yes	208	73	35.1	135	64.9	1	
No	144	12	8.3	132	91.7	5.948 (3.087-11.462)	**<0.001*** **

***P-value <0.05, **P-value <0.01, *** P-value < 0.001**

4.8.5 Association between predisposing factors and Timeliness

Table 4.12 Association between predisposing factors and Timeliness (n= 313)

Socio-demographic characteristics							
Factors	**Total Sample**	**Timeliness**				**Crude OR 95% CI**	**P-value**
		Yes		**No**			
		n	**(%)**	**n**	**(%)**		
Gender							
Male	22	4	18.2	18	81.8	1.706 (0.560-5.196)	0.347
Female	291	79	27.1	212	72.9	1	
Caregiver age							
< 31years	154	42	27.3	112	72.7	1	
≥ 31 years	159	41	25.8	118	74.2	1.270 (0.770-2.097)	0.349
Child age							
< 18 months	162	45	27.8	117	72.2	1	
≥ 18 months	151	38	25.2	113	74.8	2.493 (1.473-4.221)	**<0.001*** **

Table 4.12 Association between predisposing factors and Timeliness (n= 313) (cont.)

Socio-demographic characteristics							
Factors	**Total Sample**	**Timeliness**				**Crude OR 95% CI**	**P-value**
		Yes		**No**			
		n	**(%)**	**n**	**(%)**		
Relation to child							
Parents	272	79	29	193	71	1	
Others	41	5	12.1	36	87.8	2.947 (1.116-7.785)	**0.029***
Religion							
Buddhist	311	82	26.4	229	73.6	2.747 (0.170-44.419)	0.477
Non-Buddhist	2	1	50	1	50	1	
Education							
Low education	262	69	26.3	193	73.7	1.304 (0.679-2.505)	0.425
High education	51	14	27.5	37	72.5	1	
Occupation							
Self-employed	69	13	18.8	56	81.2	1.928 (0.938-3.964)	0.074
Daily-worker	30	7	23.3	23	76.7	0.947 (0.400-2.241)	0.902
Others	72	21	29.2	51	70.8	0.923 (0.497-1.713)	0.799
Housewife	142	41	28.9	101	71.1	1	
Income							
< 200,000	103	29	28.2	74	71.8	1.696 (1.931-2.072)	0.100
≥200,000	204	52	25.5	152	74.5	1	

Table 4.12 Association between predisposing factors and Timeliness (n= 313) (cont.)

Factors	Total Sample	Timeliness				Crude OR 95% CI	P-value
		Yes		No			
		n	(%)	n	(%)		
Socio-demographic characteristics							
Migration							
Yes	60	13	21.7	47	78.3	4.994 (1.925-12.957)	**<0.001*** **
No	253	70	27.7	183	72.3	1	
Child number							
< 2 children	134	35	26.1	99	73.9	1	
≥2 children	179	48	26.8	131	73.2	1.570 (0.950-2.595)	0.078
Birth Order							
< 2nd child	142	40	28.2	102	71.8	1	
≥2nd child	171	43	25.1	128	74.9	1.570 (0.950-2.595)	0.078
Health Beliefs							
Knowledge							
Poor	57	18	31.6	39	68.4	1.058 (0.470-2.382)	0.892
Fair	194	43	22.2	151	77.8	1.032 (0.543-1.961)	0.924
Good	62	22	35.5	40	64.4	1	
Perception							
Low	53	12	22.6	41	77.4	0.945 (0.388-2.300)	0.910
Moderate	200	49	24.5	151	75.5	0.661 (0.333-1.312)	0.236
High	60	20	33.3	40	66.7	1	

***P-value <0.05, **P-value <0.01, *** P-value < 0.001**

Table 4.12 presents the association between immunization timeliness and predisposing factors. In the study, the respondents with 18months or above children were two times less likely to have the timeliness than those with under 18months children. Parents were 2 times more likely to have their children immunization with timeliness than non-parent respondents. Moreover, the children with household migration status were more than 4 times failed to have the immunization with correct timeliness compared to other children. Other socio-demographic and health belief factors did not show statistically significant association with timeliness.

4.8.6 Association between Knowledge & behavioral towards additional Vaccine Preventable Diseases and Timeliness

In this analysis section, two factors; caregiver knowledge and receiving additional vaccine before were associated with the timeliness. The caregivers with high level of knowledge towards additional vaccine preventable diseases were 1.7 times likely to have immunization timeliness than those with low knowledge level. The respondents with their children receiving additional vaccine history were 7 times more likely to make the children immunization with timeliness than the rest group. Other factors like vaccination place and cost were not related to the outcome.

Table 4.13 Association between Knowledge and behaviors towards additional Vaccine Preventable Diseases and timeliness

Factors	Total Sample	Timeliness				Crude OR 95% CI	P-value
		Yes		No			
		n	%	n	%		
Knowledge							
Low	162	35	21.6	127	78.4	1.691 (1.018-2.808)	**0.042***
High	151	48	31.8	103	68.2	1	

Table 4.13 Association between Knowledge and behaviors towards additional Vaccine Preventable Diseases and timeliness (cont.)

Factors	Total Sample	Timeliness				Crude OR 95% CI	P-value
		Yes		No			
		n	%	n	%		
Behavior							
Receiving additional vaccines							
Yes	50	15	30	35	70	1	
No	263	68	25.9	195	74.1	7.214 (3.757-13.850)	**<0.001*** **
Vaccination place (n=50)							
Government health center	32	11	34.3	21	65.6	1	
Private health center	18	4	22.2	14	77.8	0.562 (0.161-1.961)	0.366
Cost (n=50)							
Free of charge	20	4	20	16	80	1.779 (0.510-6.207)	0.366
With Cost	30	11	36.7	19	63.3	1	

***P-value <0.05, **P-value <0.01, *** P-value < 0.001**

4.8.7 Association between enabling factors and Timeliness

In concerning enabling factors, the caregivers who had their children routine immunization in government health centers were 2 times more likely to have timeliness compared with those vaccinated in community center. The respondents with home delivery children were 1.9 times more likely to have immunization without timeliness than other respondents.

Table 4.14 Association between enabling factors and Timeliness

Accessibility and Availability							
Factors	**Total Sample**	**Timeliness**				**Crude OR 95% CI**	**P-value**
		Yes		**No**			
		n	**(%)**	**n**	**(%)**		
Immunization place							
Government health center	174	57	32.8	117	67.2	1	
Community center	139	26	18.7	113	81.3	2.117 (1.245-3.601)	**<0.006****
Distance							
<2kilo	269	69	25.7	200	74.3	0.472 (0.202-1.104)	0.083
≥2kiol	44	14	31.8	30	68.2	1	
Transport							
Walking	275	72	26.2	203	73.8	1.301 (0.624-2.714)	0.482
Non-walking	38	11	28.9	27	71.1	1	
Transport cost							
No cost	308	82	26.6	226	73.4	1	
With cost	5	1	20	4	80	6.058E8 (0.000)	0.999
Travel time							
≤ 15 mins	273	70	25.6	203	74.7	1.543 (0.681-3.499)	0.299
>15mins	40	13	32.5	27	67.5	1	
Waiting time							
≤ 15 mins	220	56	25.5	164	74.5	1.376 (0.780-2.426)	0.270
>15mins	93	27	29	66	71	1	

***P-value <0.05, **P-value <0.01, *** P-value < 0.001**

Table 4.14 Association between enabling factors and Timeliness (cont.)

Factors	Total Sample	Timeliness				Crude OR 95% CI	P-value
		Yes		No			
		n	(%)	n	(%)		
Accessibility and Availability							
Utilization of health service							
ANC visits							
<4 visits	89	27	30.3	62	69.7	1.467 (0.961-1.408)	0.102
≤ 4 visits	224	56	25	168	75	1	
Delivery place							
At home	112	28	25	84	75	1.978 (1.130-3.464)	**0.017****
Health Facility	201	55	27.4	146	72.6	1	
Delivered person							
Doctor	185	50	27	135	23	1	
Midwife/Nurses	102	27	26.5	75	73.5	1.530 (0.874-2.676)	0.137
Others (AMW, birth attendant)	26	6	23.1	20	76.9	2.449 (0.807-7.433)	0.114
Receiving Immunization information after delivery n=313							
Yes	215	63	29.3	152	70.7	1	
No	98	20	20.4	78	79.6	1.194 (0.690-2.065)	0.527

***P-value <0.05, **P-value <0.01, *** P-value < 0.001**

4.8.8 Association between reinforcing factors and Timeliness

Table 4.15 Association between reinforcing factors and Timeliness

Factors	Total Sample	Timeliness				Crude OR 95% CI	P-value
		Yes		No			
		n	(%)	n	(%)		
Receiving routine immunization information (n=313)							
Yes	312	83	26.6	229	73.4	1	
No	1	0	0	1	100	5.952E8 (0.000)	1.000
Information delivered by (n=313)							
Health worker/ volunteer	214	62	28.6	152	71.4	1	
Community member	99	22	22.2	77	77.8	0.974 (0.570-1.666)	0.924
Time receiving information(n=313)							
At immunization day	137	36	25.7	101	74.3	1	
1-3 days before	155	44	28.4	111	71.6	0.903 (0.536-1.520)	0.700
Other (week or months in advance)	21	4	19	17	81	0.866 (0.312-2.407)	0.783
Had good health service (n=313)							
Yes	308	81	26.3	227	73.7	1.837 (0.302-11.193)	0.509
No	5	2	40	3	60	1	
Family and social support (n=313)							
Yes	272	69	25.4	203	74.6	1	
No	41	14	34.1	27	65.9	0.733 (0.337-1.621)	0.450

Table 4.15 Association between reinforcing factors and Timeliness (cont.)

Factors	Total Sample	Timeliness				Crude OR 95% CI	P-value
		Yes		No			
		n	(%)	n	(%)		
Having immunization card (n=313)							
Yes	208	71	34.2	136	65.7	1	
No	105	24	22.6	81	77.1	2.057 (1.156-3.663)	**0.014****

***P-value <0.05, **P-value <0.01, *** P-value < 0.001**

Table 4.15 shows the association between reinforcing factors and timeliness. There was a significant relationship between immunization timeliness and having of immunization record. The respondents who had immunization cards were 2 times more likely to have timeliness than the rest group. Other remaining factors did not have association with timeliness.

4.8.9 Association between predisposing factors and Utilization of immunization service

In terms of predisposing factors, six variables; child age, migration, caregiver relationship, household income, child birth order and number were related with utilization of immunization service. The respondents with equal or above 18 months children were 4 times likely to fail having utilization of immunization service compared to those with under 18 months children. Similarly, non-parent caregivers were 4 times more likely not to have the service utilization than parents. The respondents with low income were 7 times less likely to utilize the service than those with high income level. Non-migrant respondents were 3 times more likely to use children immunization service compared to the remained migrant respondents. Further, the caregivers with first or one child were more than 1 time more likely to utilize immunization service than the other caregiver as shown in table 4.16.

Table 4.16 Association between predisposing factors and utilization of immunization service, (n= 313)

Socio-demographic characteristics							
Factors	**Total Sample**	**Utilization of immunization service**				**Crude OR 95% CI**	**P-value**
		Yes		**No**			
		n	**(%)**	**n**	**(%)**		
Gender							
Male	22	3	13.6	19	86.4	1.968 (0.566- 6.852)	0.287
Female	291	69	23.7	222	76.3	1	
Caregiver age							
< 31years	154	41	26.6	113	73.4	1	
≥ 31 years	159	31	19.5	128	80.5	1.498 (0.881- 2.847)	0.135
Child age							
< 18 months	162	55	34	107	66		
≥ 18 months	151	17	11.3	134	88.7	4.052 (2.223- 7.385)	**<0.001*** **
Relation to child							
Parents	272	69	25.4	203	74.6	1	
Others	41	3	7.3	38	92.7	4.305 (1.288- 14.391)	**<0.018***
Religion							
Buddhist	311	72	23.2	239	76	1	
Non-Buddhist	2	0	0	2	100	4.867E8 (.000)	0.999
Education							
Low education	262	58	22.1	204	77.9	1.331 (0.674 – 2.629)	0.410
High education	51	14	27.5	37	72.5	1	

Table 4.16 Association between predisposing factors and utilization of immunization service, (n= 313) (cont.)

Socio-demographic characteristics							
Factors	**Total Sample**	**Utilization of immunization service**				**Crude OR 95% CI**	**P-value**
		Yes		**No**			
		n	**(%)**	**n**	**(%)**		
Occupation							
Self-employed	69	9	13	60	87	2.181 (0.982 – 4.843)	0.055
Daily-worker	30	8	26.7	22	73.3	0.900 (0.368- 2.201)	0.817
Other	72	20	27.8	52	72.2	0.850 (0. .448 -1.615)	0.621
Housewife	142	35	24.6	107	75.4	1	
Income							
< 200,000	103	6	5.8	97	94.2	7.732 (3.223- 18.551)	**<0.001*** **
≥200,000	204	66	32.4	138	67.6	1	
Migration							
Yes	60	5	8.3	55	91.7	3.962 (1.522- 10.319)	**0.005****
No	253	67	26.5	186	73.5	1	
Child number							
< 2 children	134	39	29.1	95	70.9	1	
≥2 children	179	33	18.4	146	81.6	1.816 (1.068- 3.088)	**0.028***
Birth Order							
< 2nd child	142	40	28.2	102	71.8	1	
≥2nd child	171	32	18.7	139	81.3	1.703 (1.002- 2.895)	**0.049***

Table 4.16 Association between predisposing factors and utilization of immunization service, (n= 313) (cont.)

Health Beliefs							
Factors	**Total Sample**	**Utilization of immunization service**				**Crude OR 95% CI**	**P-value**
		Yes		**No**			
		n	**%**	n	**%**		
Knowledge							
Poor	57	10	17.5	47	82.5	1.500 (0. .612-3.677)	0.375
Fair	194	47	24.2	147	75.8	0.998 (0. .512-1.946)	0.996
Good	62	15	24.2	47	75.8	1	
Perception							
Low	53	10	18.9	43	81.1	1.075 (0.422 -2.737)	0.879
Moderate	200	50	25	150	75	0.750 (0. .369-1.524)	0.426
High	60	12	20	48	80	1	

***P-value <0.05, **P-value <0.01, *** P-value < 0.001**

4.8.10 Association between knowledge and behavioral towards additional Vaccine Preventable Diseases and Utilization of immunization service

Table 4.17 Association between knowledge and behavioral towards additional Vaccine Preventable Diseases and utilization of immunization service

Factors	Total Sample	Utilization of immunization service				Crude OR 95% CI	P-value
		Yes		No			
		n	%	n	%		
Knowledge							
Low	162	37	22.8	125	77.2	1.019 (0. .602-1.726)	0.943
High	151	35	23.2	116	76.8	1	
Behavior							
Receiving additional vaccines							
Yes	50	32	64	18	36		
No	263	40	15.2	223	84.8	9.911 (5.080- 19.337)	**<0.001*** **
Vaccination place (n=50)							
Government health center	32	19	59.4	13	40.6	1.779 (0. .510-6.201)	0.366
Private health center	18	13	72.2	5	27.8	1	
Cost (n=50)							
Free of charge	20	11	55	9	45	1.909 (0. .588- 6.196)	0.282
With cost	30	21	70	9	30	1	

***P-value <0.05, **P-value <0.01, *** P-value < 0.001**

As shown in table 4.17, the caregivers with children who had other vaccines apart from routine immunization were 9.9 times more likely to have routine

immunization with correct timeliness than those with children without additional vaccines. There were no other relationship between variables and the outcome.

4.8.11 Association between enabling factors and Utilization of immunization service

Table 4.18 Association between enabling factors and utilization of immunization service (n= 313)

Accessibility and Availability							
Factors	**Total Sample**	**Utilization of immunization service**				**Crude OR 95% CI**	**P-value**
		Yes		**No**			
		n	**(%)**	**n**	**(%)**		
Routine immunization place							
Government health center	139	33	23.7	106	76.3	1	
Community center	174	39	22.4	135	77.6	1.078 (0. .635-1.829)	0.782
Distance							
<2kilo	269	65	24.2	204	75.8	1	
≥2kiol	44	7	15.9	37	84.1	1.684 (0.716-3.959)	0.232
Transport							
Walking	275	62	22.5	213	77.5	1.227 (0. .565-2.664)	0.605
Non-walking	38	10	26.3	28	73.7	1	
Transport cost							
No cost	308	72	23.4	236	76.6	1	
With cost	5	0	0	5	100	4.929E8 (0.000)	0.999

Table 4.18 Association between enabling factors and utilization of immunization service (n= 313) (cont.)

Accessibility and Availability							
Factors	**Total Sample**	**Utilization of immunization service**				**Crude OR 95% CI**	**P-value**
		Yes		**No**			
		n	**(%)**	**n**	**(%)**		
Travel time							
≤ 15 mins	273	64	23.4	209	76.6	1	
>15mins	40	8	20	32	80	1.225 (0.537-2.792)	0.629
Waiting time							
≤ 15 mins	220	57	25.9	163	74.1	1	
>15mins	93	15	16.1	78	83.9	1.818 (0.969-3.413)	0.063
Utilization of health service							
ANC visits							
<4 visits	89	5	5.6	84	94.4	7.169 (2.782-18.473)	**<0.001*** **
≤ 4 visits	224	67	29.9	157	70.1	1	
Delivery place							
At home	112	16	14.3	96	85.7	2.317 (1.256- 4.276)	**0.007** **
Health Facility	201	56	27.9	145	72.1		

Table 4.18 Association between enabling factors and utilization of immunization service (n= 313) (cont.)

Accessibility and Availability							
Factors	**Total Sample**	**Utilization of immunization service**				**Crude OR 95% CI**	**P-value**
		Yes		**No**			
		n	**(%)**	**n**	**(%)**		
Delivered person							
Doctor	185	51	27.6	134	72.4	1	
Midwife/ Nurses	102	18	17.6	84	82.4	1.776 (0.972- 3.245)	0.062
Others	26	3	11.5	23	88.5	2.918 (.840- 10.140)	0.092
Receiving Immunization information after delivery							
Yes	215	54	25.1	161	74.9	1	
No	98	18	18.4	80	81.6	1.491 (0.821-2.708)	0.190

***P-value <0.05, **P-value <0.01, *** P-value < 0.001**

Regarding enabling factors, two variables; ANC visit during pregnancy and child delivery place were associated with the outcome. The analysis result showed that the caregivers with children who received 4 or above maternal antenatal care visits were 7 times more likely to utilize the immunization service than other children. Additionally, the caregivers with home delivered children were 2 times less likely to have utilization of immunization service than those with children who delivered at health facilities as shown in table 4.18.

4.8.12 Association between reinforcing factors and Utilization of immunization service

Below table 4.19 presents the association between reinforcing factors and utilization of immunization service. There was no statistically significant association between the outcome and most factors apart from one variable; having immunization

card. The caregivers with immunization cards were 3.5 times more likely to utilize the immunization service than those without cards.

Table 4.19 Association between reinforcing factors and Utilization of immunization service, (n= 313)

Factors	Total Sample	Utilization of immunization service				Crude OR 95% CI	P-value
		Yes		No			
		n	(%)	n	(%)		
Receiving routine immunization information							
Yes	312	72	23.1	240	76.9	1	
No	1	0	0	1	100	4.846E8 (0.000)	1.000
Information delivered by							
Health worker/ volunteer	213	49	23	164	77	1.013 (0.576-1.782)	0.965
Community member	100	23	23.2	77	76.8	1	
Time receiving information							
At immunization day	136	29	21.3	107	78.7	1.476 (0.526- 4.142)	0.460
1-3 days before	155	37	23.9	118	76.1	1.276 (0.462-3.524)	0.639
Had good health service							
Yes	308	71	23.1	237	76.9	1	
No	5	1	20	4	80	1.198 (0.132-10.894)	0.872
Family and social support							
Yes	272	66	24.3	206	75.7	1	
No	41	6	14.6	35	85.4	1.869 (0.753-4.640)	0.178

Table 4.19 Association between reinforcing factors and Utilization of immunization service, (n= 313) (cont.)

Factors	Total Sample	Utilization of immunization service				Crude OR 95% CI	P-value
		Yes		No			
		n	(%)	n	(%)		
Having immunization card							
Yes	208	61	29.3	147	70.7	1	
No	105	11	10.5	94	89.5	3.546 (1.775- 7.086)	**<0.001*** **

***P-value <0.05, **P-value <0.01, *** P-value < 0.001**

4.9 Predictive factors for immunization

Table 4.20 Adjusted Odd Ratio of independent variables associated with completion of types of immunization (Full Model)

Independent variables	Adjusted OR	(95% CI)		P-value
		Lower	Upper	
1. Caregiver Gender				
Male	0.587	0.073	4.730	0.617
Female	1			
2. Caregiver Age Group				
<31 years	1			
≥ 31years	1.731	0.728	4.120	0.215
3. Child Age Group				
<18 months	1			
≥ 18months	3.470	1.565	7.696	**0.002****
4. Education				
Low	0.908	0.342	2.409	0.846
High	1			
5. Occupation				
Self-employed	2.758	0.880	8.646	0.082
Daily-worker	0.606	0.136	2.711	0.512
Other	0.709	0.272	1.851	0.482
Housewife	1			

Table 4.20 Adjusted Odd Ratio of independent variables associated with completion of types of immunization (Full Model) (cont.)

Independent variables	Adjusted OR	(95% CI) Lower	Upper	P-value
8. Income				
Low	11.128	3.624	34.167	**<0.001*** **
High	1			
7.Relation to child				
Parent	1			
Non-parent	2.242	0.447	11.238	0.326
8. Migration				
Yes	4.025	1.220	13.281	**0.022***
No	1			
9. Child Number				
<2 children	1			
≥ 2 children	4.161	0.250	69.251	0.320
10. Birth Order				
<2nd child	1			
≥ 2nd child	0.262	0.262	0.016	0.349
11.Knowledge towards EPI				
Poor	1.177	0.309	4.486	0.811
Fair	1.011	0.358	2.858	0.983
Good	1			
12.Perception towards EPI				
Low	0.490	0.110	2.189	0.350
Moderate	0.351	0.120	1.029	0.056
High	1			
13. Receiving additional vaccine before				
Yes	1			
No	11.486	4.118	32.035	**<0.001*** **
14. ANC visit				
<4visits	6.599	1.965	22.164	**0.002****
≥ 4 visits	1			
15. Delivery place				
At home	0.933	0.194	4.485	0.932
Health facility	1			

Table 4.20 Adjusted Odd Ratio of independent variables associated with completion of types of immunization (Full Model) (cont.)

Independent variables	Adjusted OR	(95% CI)		P-value
		Lower	Upper	
16. Person assisted delivery				
Doctor	1			
MW/Nurses	1.152	0.274	4.838	0.847
Others	4.777	0.427	53.490	0.204
17. Routine immunization place				
Government health center	1.050	0.482	2.289	0.901
Community center	1			
18. Having good health care				
Yes	1			
No	2.995	0.153	58.610	0.470
19. Family/ social support				
Yes	1			
No	1.841	0.519	6.525	0.344
20. Immunization Card				
Yes	1			
No	3.777	1.503	9.489	**0.005****

***P-value <0.05, **P-value <0.01, *** P-value < 0.001**

Table 4.21 Adjusted Odd Ratio of independent variables associated with Timeliness (Full Model)

Independent variables	Adjusted OR	(95% CI)		P-value
		Lower	Upper	
1. Caregiver Gender				
Male	0.573	0.133	2.474	0.455
Female	1			
2. Caregiver Age Group				
<31 years	1			
≥ 31years	1.114	0.551	2.252	0.763
3. Child Age Group				
<18 months	1			
≥ 18months	2.108	1.099	4.044	**0.025***

Table 4.21 Adjusted Odd Ratio of independent variables associated with Timeliness (Full Model) (cont.)

Independent variables	Adjusted OR	(95% CI)		P-value
		Lower	Upper	
4. Education				
Low	0.750	0.327	1.722	0.498
High	1			
5. Occupation				
Self-employed	1.416	0.580	3.454	0.445
Daily-worker	0.577	0.183	1.826	0.350
Other	0.658	0.299	1.450	0.299
Housewife	1			
6. Income				
Low	2.757	1.275	5.964	**0.010****
High	1			
7.Relation to child				
Parent	1			
Non-parent	2.243	0.649	7.750	0.202
8. Migration				
Yes	4.673	1.591	13.723	**0.005****
No	1			
9. Child Number				
<2 children	1			
≥ 2 children	3.133	0.285	34.459	0.351
10. Birth Order				
<2nd child	1			
≥ 2nd child	0.374	0.034	4.075	0.419
11.Knowledge towards EPI				
Poor	0.840	0.294	2.402	0.745
Fair	1.127	0.492	2.582	0.777
Good	1			
12.Perception towards EPI				
Low	0.673	0.205	2.208	0.513
Moderate	0.500	0.209	1.198	0.120
High	1			
13. Receiving additional vaccine before				
Yes	1			
No	4.539	2.074	9.935	**<0.001*****

Table 4.21 Adjusted Odd Ratio of independent variables associated with Timeliness (Full Model) (cont.)

Independent variables	Adjusted OR	(95% CI)		P-value
		Lower	Upper	
14. ANC visit				
<4visits	2.978	1.226	7.232	**0.016***
≥ 4 visits	1			
15. Delivery place				
At home	1.847	0.495	6.888	0.361
Health facility	1			
16. Person assisted delivery				
Doctor	1			
MW/Nurses	0.513	0.146	1.796	0.296
Others	0.990	0.153	6.408	0.992
17. Routine immunization place				
Government health center	1.338	0.699	2.561	0.380
Community center	1			
18. Having good health care				
Yes	1			
No	0.533	0.056	5.105	0.586
19. Family/ social support				
Yes	1			
No	0.933	0.358	2.437	0.888
20. Immunization Card				
Yes	1			
No	1.415	0.693	2.887	0.340

***P-value <0.05, **P-value <0.01, *** P-value < 0.001**

Table 4.22 Adjusted Odd Ratio of independent variables associated with utilization of immunization service (Full Model)

Independent variables	Adjusted OR	(95% CI)		P-value
		Lower	Upper	
1. Caregiver Gender				
Male	0.561	0.089	3.542	0.538
Female	1			
2. Caregiver Age Group				
<31 years	1			
≥ 31years	1.675	0.739	3.797	0.217
3. Child Age Group				
<18 months	1			
≥ 18months	3.498	1.609	7.607	**0.002****
4. Education				
Low	0.634	0.244	1.645	0.348
High	1			
5. Occupation				
Self-employed	1.285	0.436	3.785	0.649
Daily-worker	0.315	0.090	1.374	0.133
Other	0.488	0.195	1.219	0.125
Housewife	1			
6. Income				
Low	6.646	2.367	18.657	**<0.001*****
High	1			
7.Relation to child				
Parent	1			
Non-parent	3.101	0.623	15.431	0.167
8. Migration				
Yes	3.459	1.065	11.234	**0.039***
No	1			
9. Child Number				
<2 children	1			
≥ 2 children	2.378	0.160	35.422	0.530
10. Birth Order				
<2nd child	1			
≥ 2nd child	0.442	0.030	6.502	0.551

Table 4.22 Adjusted Odd Ratio of independent variables associated with utilization of immunization service (Full Model) (Cont.)

Independent variables	Adjusted OR	(95% CI)		P-value
		Lower	Upper	
11.Knowledge towards EPI				
Poor	1.096	0.311	3.857	0.887
Fair	1.024	0.394	2.665	0.961
Good	1			
12.Perception towards EPI				
Low	0.782	0.191	3.202	0.732
Moderate	0.637	0.240	1.694	0.367
High	1			
13. Receiving additional vaccine before				
Yes	1			
No	6.646	2.778	15.900	**<0.001*** **
14. ANC visit				
<4visits	4.858	1.509	15.646	**0.008** **
≥ 4 visits	1			
15. Delivery place				
At home	1.304	0.292	5.829	0.729
Health facility	1			
16. Person assisted delivery				
Doctor	1			
MW/Nurses	0.646	0.162	2.570	0.535
Others	1.839	0.203	16.622	0.588
17. Routine immunization place				
Government health center	0.813	0.385	1.714	0.586
Community center	1			
18. Having good health care				
Yes	1			
No	1.462	0.091	23.612	0.789
19. Family/ social support				
Yes	1			
No	1.051	0.324	3.402	0.934
20. Immunization Card				
Yes	1			
No	2.883	1.173	7.086	**0.021***

***P-value <0.05, **P-value <0.01, *** P-value < 0.001**

After eliminating the insignificant variables, the best suited method; Backward Wald was chosen for the final multiple logistic regressions. In the final model, after adjusting the other variables the most significant predictors to type of immunization and utilization of immunization service were child age, household income, and migration, ANC visit, receiving additional vaccines and having immunization care. As well as five significant factors; child age, house income, ANC visit, migration and child receiving additional vaccines were associated with timeliness.

Table 4.23 The final model of Multiple Logistic Regression

Factors	Type of immunization	Timeliness	Utilization of immunization service
	Adjusted OR (95%CI)	**Adjusted OR (95%CI)**	**Adjusted OR (95%CI)**
1. Child Age			
<18 months	1	1	1
≥ 18months	3.368 **(1.576-7.200)****	2.077 **(1.098-3.930)***	3.491 **(1.625-7.500)*****
2. Caregiver Age			
<31 years	1	N/A	1
≥ 31 years	1.62 (0.755-3.476)		1.652 (0.810-3.367)
3. Caregiver relationship to child			
Parent	1	1	1
Non-parent	3 (0.577-15.603)	2.104 (0.656-6.750)	3.378 (0.722-15.803)
4. Birth Order			
<2nd child	N/A	1	N/A
≥ 2nd child		0.371 (0.035-3.983)	
5. Child Number			
<2 children	N/A	1	N/A
≥ 2 children		3.379 (0.315-36.194)	
6. Income			
Low	8.81 **(3.241-23.946)*****	2.51 **(1.198-5.260)***	6.358 **(2.353-17.183)*****
High	1	1	1

Table 4.23 The final model of Multiple Logistic Regression (cont.)

Factors	Type of immunization	Timeliness	Utilization of immunization service
	Adjusted OR (95%CI)	**Adjusted OR (95%CI)**	**Adjusted OR (95%CI)**
7. Migration			
Yes	3.426 **(1.131-10.374)***	4.458 **(1.555-12.782)****	3.275 **(1.053-10.189)***
No	1	1	1
8. ANC visit			
<4visits	7.969 **(2.522-25.184)*****	2.865 **(1.202-6.830)***	4.771 **(1.552-14.667)****
≥ 4 visits	1		1
9. Delivery place			
At home	N/A	1.935 (0.530-7.069)	N/A
Health facility		1	
10. Person assisted delivery			
Doctor		1	1
MW/Nurses	N/A	0.506 (0.149-1.716)	0.795 (0.352-1.796)
Others		0.953 (0.153-5.945)	2.416 (0.502-11.635)
11. Receiving Additional Vaccines before			
Yes	1	1	1
No	10.349 **(4.073-26.293)*****	4.421 **(2.047-9.550)*****	6.269 **(2.721-14.441)*****
12. Having Immunization Card			
Yes	1	1	1
No	3.867 **(1.616-9.255)****	1.469 (0.730-2.954)	3.145 **(1.326-7.461)****
13. Education			
Low	N/A	0.751 (0.329-1.716)	0.633 (0.251-1.597)
High		1	1

Table 4.23 The final model of Multiple Logistic Regression (cont.)

Factors	Type of immunization	Timeliness	Utilization of immunization service
	Adjusted OR (95%CI)	**Adjusted OR (95%CI)**	**Adjusted OR (95%CI)**
14. Occupation			
Self-employed	2.627 (0.905-7.622)	1.283 (0.552-2.980)	1.169 (0.433-3.156)
Daily-worker	0.526 (0.140-1.973)	0.506 (0.171-1.496)	0.28 (0.079-0.990)
Other	0.731 (0.294-1.815)	0.631 (0.290-1.375)	0.475 (0.196-1.149)
Housewife	1	1	1
15. Perception			
Low	0.609 (0.159-2.337)	0.659 (0.216-2.012)	N/A
Moderate	0.381 (0.143-1.019)	0.53 (0.230-1.219)	
High	1	1	

***P-value <0.05, **P-value <0.01, *** P-value < 0.001,**

Remark: Hosmer-Lemeshow goodness of fit, *Significant level*: Type of vaccine (0.015), Timeliness (0.013), Utilization of immunization service (0.597)

N/A: the independent variables were excluded during the backward procedure of Multiple Logistic Regression.

As shown in table 4.23, the caregivers with aged 18months or above children were 3.3 times less likely to complete type of immunization (P-value<0.01) and 2 times less likely to have correct timeliness (P-value <0.05) as well as 3.5 times less likely to have immunization service(P-value <0.001) compared with those with under 18months children. Likewise, the respondents from low income households were 8.8 times more likely to have no type of immunization (P-value<0.001), 2.5 times less likely to have timeliness (P-value<0.05) and 6.3 times more likely to fail having utilization of immunization service (P-value<0.001) compared to those from high come family. Migration status was found significantly associated in this study with all outcomes.

Furthermore, the numbers of antenatal care visits during pregnancy was also significant predictors of all the study outcomes among caregivers. The caregivers with children who received additional vaccines were 10 times more likely to have type of EPI vaccines and 4.4 times more likely to make timeliness and 6.2 times more to utilize immunization service with significant P-vale <0.001 compared to the caregivers with children who were not additionally vaccinated. Having immunization card was also found to be a significant predictor of both completion of type of immunization (P-vale <0. 01) and utilization of immunization service (P-vale <0.01) among the caregivers in this study.

CHAPTER V
DISCUSSION

This study aimed to examine the prevalence of immunization of under 3 years old children in slum and the associated factors such as predisposing, enabling and reinforcing factors to utilization of immunization service among under 3 years caregivers. In this chapter, discussion regarding the results of the study will be conducted as the following topics:

1. Immunization status of the children
2. Association between Predisposing factors and immunization
    2.1 Socio-demographic characteristics
    2.2 Knowledge and perception towards immunization
3. Association between Knowledge and behavioral towards additional vaccine preventable diseases and immunization
4. Association between enabling factors and immunization
5. Association between reinforcing factors and immunization
6. Predictors of immunization
7. Strengths and limitations of the study

5.1 Immunization status of the children

The study found out that 24% of children had received all recommended doses of the routine EPI vaccines, while 64.8% of them had missed at least one dose of the routine EPI vaccines, and 11.1% of the children were never immunized at the time of data collection. The completion of type of immunization according to the national schedule was only 24.1% whereas no completion of type of immunization that included partial immunization status and no immunization at all was 75.9%. There was only 26.5% of the immunized children were with correct timeliness, whereas the others (73.5%) did not have vaccination with timeliness. In terms of utilization of immunization service, (23%) of the caregivers had utilized immunization service, while (77%) of those did not use the service. This coverage result was quite low compared to not only previous immunization study finding in hill tribe region of Myanmar but also national EPI coverage target which was set to achieve 95% nationally with minimum 80% in every region for all antigens (20, 23).

A study from Timor-Leste also found out that 33% of children with complete immunization, while 40% had partially immunized and 27% had with no immunization at all(83) . Likewise, the South zone of Nigeria where five of six States studied were located, the full immunization coverage was 36% (84). So, this study result was more or less similar to those findings. Ministry of Health and sport had introduced a new polio injection vaccine (IPV) in early 2016. However the vaccine was shortage in the study area in October 2016. In the study, 11.8% of total incomplete immunization was because of Polio injection (IPV) vaccine shortage while 22.4% due to IPV vaccination not started yet at the time of vaccination age. Main reasons for incomplete immunization that were given by some caregivers (100) were travelling during immunization time (38%), being busy (20%) and child was having fever (10%). Moreover, in this study, the majority of children were immunized with a delay of 1-2months only. There were 39 children who never immunized at all at the time of study. Not only the immunization coverage but also timely vaccinations are still in demand to be developed with systematic health strategies.

5.2 Association between Predisposing factors and immunization

5.2.1 Socio-demographic characteristics

In this study, some socio-demographic characteristics; child age, caregiver gender, caregiver relationship to child, education, occupation, household income, migration status, child number and birth order are associated with immunization status.

Age

In terms of child age, the study assessed the immunization status of the children aged under 3years in the area. Then, they were divided into under 18 months and 18months and above. There was a significant association between child age and type of immunization (P<0.001). The caregivers with children aged 18months and above were 3.5 times more likely to complete type of immunization service, 2.9 times more likely to delay immunization and 4 times less likely to utilize immunization service than the other group. It matched with the result of other immunization study that was conducted in Greece and Iran. (64, 85)

Regarding caregiver age, about half of the respondents were under 31 years and the others were 31 years and above. Although 31years and above group were more than 1times less likely to have timely vaccination, there was no significant association in Chi-square test.

Caregiver gender and relationship to child

In this study, female caregivers were 3.4 times more likely to have type of immunization than male caretaker with P-value <0.05. Likewise, male were more 1.9 times less likely to delay and incomplete their children immunization. It could be possible that most of the female caregivers were housewives and they were likely to have more time to take care of their children than male working caregivers.

There was a significant association between caregiver relationship to child and immunization in this study. Most of the respondents were child's mothers (77.4%) and they were 4 times (P-value<0.01) more likely to have type of immunization compare to other non-parental caregivers such as grandparents and siblings. Moreover, parents were 2.9 times more likely to vaccinate the children in time and 4 times more likely to utilize immunization service than other caregivers. It was supported by a

previous study that mentioning compared with parents, non-primary caregivers were more likely to have a child who missed opportunities for vaccination or delayed immunization (86).

Education

The study result showed that more than half of the respondents (86.2%) were with low education while the rest minorities were with the high education. There was an association between caregiver's education levels with type of immunization. Caregivers with low education were 2times less likely to complete type of immunization compare to high education group. The completion of type of immunization was high among the respondents with high education because probably they had higher concern and being aware of advantage of immunization along with the education level. The result was alike with the other previous studies (35, 87-89).

Occupation

The majority of the respondents were housewives (46%) and the rests were self-employed (such as merchants, shop keepers), daily workers, and others (such as government/company staffs). There was a significant association that housewife caregivers were more than 3 times more likely to make type of immunization and nearly 2 times more likely to utilize the service compare to self-employed respondents. It could be because the housewives had more time to take care of their child health regarding immunization than busy self-employ workers. The finding was corresponded to an another immunization study which was conducted among migrants in East China (87).

Religion

There was no association between religion and immunization status. 99% of the respondents were Buddhist and it could be because of the Buddhist influential country. The finding was consistent with the previous studies (20, 90).

Income

This study finding revealed that monthly household family income was strongly correlated with type of immunization and age appropriate vaccination. Caregivers with high income were more than 11 times likely to have type of immunization and 7 times more likely to utilize the immunization service than those

having low household income. A similar result was found in several previous studies (13, 35, 91, 92).

Migration

In the study results, 22% of the respondents were migrants who were moved to the survey area in last 12 months, of which 92% of them were with no type of immunization. It was 4.6 times higher in non-migrant child caregivers compare to those recent migrants. Migrant children were 4.9 times more likely to be delayed immunized and 3.9 times more likely to be utilized immunization service. Most of the recent migrants had neither immunization card nor their children being registered in health facility record. Further, in migrant families, caregivers' education and socioeconomic status is low and the attention towards child immunization is decreased. It might be a major challenge for them to have poor and delayed immunization among the children. This study contradicted with the previous studies that found the migration status had significant association with timely and complete immunization (83, 87, 89, 93).

Child Number and birth order

This study found that poor immunization status was mostly among the caregivers with two or more children and second or above children. The caregivers with only one child were 1.9 times more likely to have full type of immunization and 1.8 times more likely to utilize vaccination service compared to the other group with more than one child. Furthermore, the respondents with first born child had 1.7 times more likely to make type of immunization and use full immunization service than those with children who were second or other above orders. The reason might be the caregivers with only one or first children would pay more attentions to their only child and could take care of their child's health status with more time than the caregivers with two or more than children. A study in Greece also indicated that increased household size with two or more children was negatively associated with on time vaccination and type of immunization (85). It was observed that complete and delayed immunization rate decreased as birth order increased (64, 94).

5.2.2 Knowledge and perception towards immunization status

In this study, more than half of the respondents (60%) were with fair knowledge on childhood immunization. The caregivers with poor knowledge were 1.7 times likely to fail to have type of immunization and 1.5 times more likely to fail utilization of immunization service than people with good knowledge. There was no significant association between knowledge and it was opposed the previous study in hill tribe region of Myanmar and other studies (20, 95, 96). However, the outcome in this study similar to the other studies (51, 93, 97, 98).

In terms of perception towards immunization, it was measured by the health belief model. It included perceived susceptibility, severity, benefit and barriers towards utilization of the service. The majority of the respondents (63%) had moderate level whereas low and high group were about (18%) each. The respondents with high perception level were 1time more like to have type of immunization and utilize the service compared to those with low level. From the results, there was no significant association between the perception and immunization status , consistent with the result of other study (99) . On the other hand, it was opposed with other studies (20, 32).

5.3 Association between Knowledge and behavioral towards additional vaccine preventable diseases and immunization status

In this study, assessing the caregiver's knowledge and behavioral towards additional vaccine and preventable diseases such as Japanese Encephalitis, Rotavirus and Hepatitis B which were not contained in EPI program was also conducted. Regarding knowledge, (52%) of the respondents had low knowledge towards additional vaccines and vaccine preventable diseases. The caregivers with high knowledge were 1 time more likely to have type of immunization and utilization of the service compared to the respondents with low literacy. There was a significant association between timeliness alone and knowledge level. The respondents with low knowledge level were 1.7 times more likely to delay their children immunization.

In terms of behavior, only 50 respondents (14%) answered that they had additional Hepatitis B vaccine to their children. The result showed that no child had received other vaccinations such as Japanese Encephalitis or Rotavirus apart from

Hepatitis B vaccine. Most respondents had little knowledge on those diseases and they were not aware of those kinds of additional vaccines before. This could be a major reason for poor utilization and immunization of those vaccines among the caregivers. There was a significant association (P-value<0.001) between receiving additional vaccine before and the study outcomes. The caregivers who had the additional vaccine before were 17 times more likely to have type of immunization, 7.2 times more likely to vaccinate in time and 9.9 times more likely to utilize the immunization service than other group.

The caregivers had the additional vaccine from both government (64%) and private (36%) hospitals. 40% of the respondents had the vaccination with free of charge while 60% of them had it with cost. There was no relationship between those factors and type of routing immunization service.

5.4 Association between enabling factors and immunization status

Concerning utilization of previous health care service, ANC visit, child delivery place, person assisted delivery and routine immunization place were found to be associated with child immunization status.

ANC visit

Regarding ANC visits, (68%) of the child's mothers had 4 or above ANC visits and this factor favored the caregivers to have full type of immunization (P-value <0.001). The study found out that if the children had maternal history with 4 or above ANC visits, they were 10.5 times more likely to have type of immunization and 7 times more likely to have utilization of immunization service compare to other group. This result agreed with many previous immunization studies (15, 55, 60, 87, 100).

Delivery Place

In the study area, (39%) of the respondent's children were delivered at home, while the rest (61%) were born in health centers. The caregivers with children were delivered at home were 3 times more likely to fail to have type of immunization and nearly 2 times less likely to delay and make poor utilization of immunization than the rest respondents with health center born children. From the study result, there was

a relation between child delivery place and immunization status, consistent with other studies (10, 77, 101, 102).

Delivered person

(9%) of the respondent's children were delivered by unskilled birth attendants while (56%) delivered with medical doctors and (34%) with midwives or nurses. The analysis result showed that this factor was associated with the outcome. Children delivered by doctor and midwife/nurses were 4 times and 2times more likely to be immunized fully than the other children. The previous studies supported this finding that person assisted delivery found to be important predictors of immunization (84, 92).

Routine Immunization Place

The study results showed that (55.4%) of the children were immunized regularly at government health centers such as urban health center or hospital, while (44%) of them were immunized at community centers during EPI outreaches. There was a significant relation between the immunization place and timeliness. The children immunized at health centers were 2 times more likely to have timeliness compared to other children immunized at community centers. The health persons usually perform monthly routine immunization outreaches to places with no health centers. However the visit schedules might be adjusted according to availability of the staffs and seasonal challenges. This could affect the timeliness of the immunization. The result was similar to a previous immunization study (15).

5.5 Association between reinforcing factors and immunization status

In terms of reinforcing factors, there was no significant association between the factors and type of immunization except for family& social support and having immunization card.

Family & Social supports

Among 352 respondents, (86%) of them replied that they had their family and social supports toward immunization whereas (14%) did not have the support. The caregivers had social support from their neighbors, friends and volunteers. Most of the respondents received the supports in terms of immunization information such as time

and place of vaccination and knowledge of vaccine advantages from their society. Both this study and previous immunization study in Myanmar found that the family & social support influenced on utilization of immunization service. Another study also agreed on that by mentioning caregivers of children who were fully vaccinated received more (financial or moral) support from their families (20, 83).

Immunization card

Regarding having immunization card, in this study (59%) of the caregivers had the immunization card while (41%) did not have their children vaccination cards. There was a strong association between having immunization card and immunization status. If the caregivers had the card, they were 5.9 times more likely to complete type of immunization, 2 times more likely to have timeliness and 3.5 times more likely to utilize immunization service than those who did not have. The reason of this might be caregivers with the cards were more likely to be aware and remember the immunization schedule, next vaccination appointments (dates) and had low chance to drop out than the respondents without cards. The same result was found out in previous similar studies (103, 104).

5.6 Predictors of immunization status

As the result of the final model analysis for predictors, 6 predictors; child age group, household income, migration, ANC visit, receiving additional vaccines before and having immunization card were significantly associated with the study outcomes. This study area was an urban slum area with migrant households. Most of the caregivers with poor utilization service were recent migrants who moved to the area in last 12 months and they did not have vaccination cards as well as the children were not registered yet in the health facility of the immunization program. Therefore, it was a main barrier for unsatisfactory immunization status. Vaccination card is one of the important tools which can affect the calculation and evaluating of the child's immunization status. Preservation of the cards is still very poor among the caregivers and this need to be emphasized. At the same time, implementing of effective Health information management system that focusing on vulnerable, socio-economically disadvantaged migrants would help in achieving good immunization coverage.

The study also found out that the studied community had limited knowledge and awareness towards additional vaccine preventable diseases such as Japanese Encephalitis, Rotavirus infection which also frequently happened outbreaks and caused mortality and morbidity among Myanmar young children. Moreover, there was no child in the study area received those additional vaccines apart from Hepatitis B. Health education and awareness regarding additional vaccine preventable diseases should be promoted along with EPI program to the population. As antenatal and postal care activities lead to increase immunization uptake, those program should be emphasized and monitored regularly.

Appropriate public health plans and health strategies should be made addressing missed or late vaccination in order not only to develop age-appropriate immunization coverage or timely immunization but also to promote the utilization of childhood immunization service for the slum population.

5.7 Strength and limitation of the study

This study was a cross-sectional descriptive study with the aims of identifying factors associated with immunization and examining the prevalence of immunization status in urban slum of Myanmar. The study questionnaires were constructed based on theorical models; PRECEED PROCEED and Health Belief Model. In order to reduce selection bias, the study recruited all primary caregivers with children aged under 3years old who agreed to participate in the study from the area. There was no previous immunization study done in caregivers who living in slum. To minimize the respondent's recall bias, the child immunization status was confirmed by immunization card or health facility record.

In terms of limitations, as the interviews were conducted to all primary caregivers, some male respondents did not know or remember the maternal history of children e.g ANC visits. Data of the 77 respondents (out of 429) had to be excluded for the data analysis due to incomplete outcome information. There might be some variations in the analysis results for not including whole sample size. Lastly, the study did not include and count new pneumococcal conjugate vaccine (PCV) in vaccination schedule. The vaccine was recently introduced by MOHS in early 2017 when the

study conceptual framework was already confirmed to use previous national immunization schedule. Therefore, the analysis of the dependent variable might be varied if the study counted on that.

CHAPTER VI
CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study was a cross-sectional descriptive study based on community household survey by conducting face-to-face interview to 429 caregivers with under 3years children in urban slum of Chanmyathazi Township, Mandalay, Myanmar. The study primarily aimed to identify the factors associated with utilization of immunization service among the caregivers and to examine the prevalence of immunization status. Later, the analysis was conducted for three main outcomes (1) utilization of immunization service, (2) timeliness and (3) immunization with timeliness.

This study found out that the prevalence of immunization was fully immunized (24%), partially immunized (64.8%) and never immunized (11.1%). One-fourth (24.1%) of the caregivers had full type of EPI immunization, while the rest three-fourth (75.9%) did not have it. Regarding timeliness, there were (26.5%) of the children with timely vaccination and (73.5%) with without timeliness. In terms of utilization of immunization service, there were (23%) with utilization of immunization service, whereas majority (77%) with no utilization. It can be concluded that the utilization of immunization service, timely and complete immunization status were quite poor in this slum areas compared to other regions of Myanmar.

According to the study analysis, there were seventeen variables that related to the dependent variable in Chi-square test. They were caregiver gender, child age, education, occupation, income, caregiver relationship to child, migration, child number, birth order, knowledge towards additional vaccine preventable diseases, receiving additional vaccine before, routine immunization place, ANC visit, child delivery place, delivery person, family & social support and having immunization card. After analyzing with final multiple logistic regression, six variables; child age, household income, migration, ANC visit, receiving additional vaccine before and

having immunization card were still significantly associated with three study outcomes with P-vale <0.05. There were six variables associated with type of immunization and utilization of immunization service, and five variables with timeliness alone.

This immunization study in slum revealed that it is needed to take attention to not only immunization coverage but also timeliness vaccination in informal settlements. Improving of health knowledge & behavioral towards additional vaccine preventable diseases and strengthening of maternal & child health care system, particularly for socioeconomic disadvantaged vulnerable slum migrants are in need to develop immunization coverage and age appropriate vaccination.

6.2 Recommendations

6.2.1 Recommendations for implementation

Based on the findings of the study, the following recommendations were suggested to consider in future intervention programs in order to improve immunization status and better service utilization.

(1) As migration favors low child immunization uptake and delayed vaccination, appropriate health services and Effective Health Information and Management Systems should be encouraged and it must be delivered with a focus on recent migrants. For example: Keeping health records in forms of electronic registration by using appropriate software in the health facilities would be reduced the dependency of hard registration card (i.e. Immunization card) will be more effective and efficient.

(2) Health policy makers should attempt for timely immunization together with high immunization coverage. Implementing of health promotion programs to raise caregivers and community awareness on the importance of immunization, timeliness and the vaccination card that a vital health record to facilitate follow up of the different vaccine doses. Hence, the chance of dropout doses will be reduced and it will encourage caregivers to have their children timely complete immunization.

(3) Uptake of standard ANC visits during pregnancy leads to increase immunization coverage with timeliness. Thus, making comprehensive maternal and

child health care system that promotes MCH during pregnancy, delivery and post delivery together with childhood immunization package, responsive particularly to vulnerable migrants in slum would help improving quality immunization coverage.

(4) Promoting EPI immunization activities in the community would be benefited especially for migrant mobile population in slums. Instead of conducting monthly EPI outreaches, increasing the visits into weekly activities or performing as a daily activity in health centers will be favored for improving quality immunization coverage of mobile vulnerable population.

(5) Health personals at all levels of the immunization program are suggested to make up-to-date data (i.e., coverage, disease burden, and program delivery data) to direct programmatic and strategic decisions that protect and reduce disease at-risk populations

(6) In order to promote accessibility to immunization, health policy maker are encouraged to strengthen the regulations and reinforce national immunization technical advisory groups, guarantee that sufficient budgets are allocated to immunization and create mechanisms to evaluate and efficiently manage funds at all levels.

6.2.2 Recommendation for future research

(1) It was suggested to include new PCV vaccine in examining of immunization status in future study.

(2) Further qualitative research or mixed study should be conducted with focus group discussion or in-depth interviews among slum child's caregivers and health care personals in order to understand their particulars barriers and challenges towards complete and timely immunization.

(3) An analytical study of immunization status among recent migrants and long stayed migrants in slums should be desirable

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APPENDICES

APPENDIX A
QUESTIONNAIRE IN ENGLISH

ID no……..…

Date: …….

Part I: Predisposing Factors

Socio-demographic characteristics of caregivers

(1) What is your (caregiver's) gender?

☐ (i) Male, ☐ (ii) Female

(2) What is your age in years?

…….years

(3) What is your child age?

……..(months)

(4) What is your relation to the child?

☐ (i) Mother, ☐ i) Father, ☐ i) Grandparents, ☐ v) other .....

(5) What is your religion?

☐ (i) Buddhist, ☐ (ii) Christian, ☐ (iii) Hindu, ☐ (iv) Muslim, ☐ (v) other……

(6) What is your education?

☐ (i)Illiteracy, ☐ ii) Primary school, ☐ (iii) Secondary school, ☐ (iv) High school, ☐ (v) Collage/University and above

(7) What is your occupation?

☐ (i) Self-employed, ☐ (ii) Daily worker, ☐ (iii) Housewife, ☐ (iv)Civil servant, ☐ (v) others …….

(8) How much is your family income per month in Kyat?

…….Kyats

(9) How long have your family been staying here (Month)?

……..

(10) How many children do you have in the family?

……

(11) What is the birth order of the child?

……..

Health Beliefs

(A) Knowledge of the caregiver towards immunization

No	Knowledge of caregiver	Yes	No	Not sure
(12)	Eight diseases that can be preventable by childhood vaccination are (1) Tuberculosis, (2) Diphtheria, (3) Pertussis, (4) Tetanus, (5)Polio, (6)Hepatitis B, (7) Haemophilus influenza type B and (8)Measles			
(13)	Polio first dose is given at birth			
(14)	The child need to receive three doses of Pentavalent vaccine			
(15)	Measles can be transmitted by breathing of infectious air			
(16)	Some children may have mild fever as side effect of the immunization			
(17)	The symptoms of tetanus are spasm of the jaw, neck, back and the whole body.			
(18)	Hepatitis B can be transmitted to another person by sneezing or coughing			
(19)	If the child has Pertussis, he will have rapid cough followed by a high-pitched “whoop”.			
(20)	Diphtheria can be transmitted by eating contaminated food including germs			
(21)	Pneumonia and diarrhea can happen as the complications of Measles.			
(22)	There is no cure for Polio infection, but can be prevented by vaccination			

(B) Perception of the caregiver towards immunization

No	Perception towards immunization	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Susceptibility						
(23)	It is necessary to immunize your children even though he is healthy.					
(24)	Young children (<5years) to vulnerable to diseases.					
(25)	If someone in the area is infected with Measles, your children can be transmitted the disease.					
Severity						
(26)	Poliomyelitis can result in permanent paralysis to death in some cases.					
(27)	Tetanus can be easily treated.					
(28)	Tuberculosis is not very dangerous and it is normal when you see a child with tuberculosis in the area.					
Benefits						
(29)	If a child is fully vaccinated, he will have a lifelong immunity and healthy life.					
(30)	A child cannot be protected from diseases by natural without complete immunization.					

(31)	Immunization can cause dangerous and severe side effects to the child.					
Barriers						
(32)	I can postpone my child vaccination if I am busy					
(33)	It takes a long time to receive immunization in the vaccination post					
(34)	It is difficult to use money for transportation charges to go immunization place.					

Health Knowledge and behavioral towards additional Vaccine Preventable Diseases

No	Statement	Yes	No	Not Sure
35	Have you ever heard of Japanese Encephalitis vaccine?			
36	Have you ever heard of Rotavirus vaccine?			
37	Have you ever heard of Hepatitis B vaccine?			
38	If the child had Rotavirus infection, he will suffer fever, vomiting and water diarrhea.			
39	Do you see children with those diseases in your neighbor? JE ☐, Diarrhea due to Rota ☐, Hep B☐			
40	Did your child receive any above vaccine before? JE ☐, Rota ☐, Hep B ☐			
	If yes, (41) where did you get? ☐ (1) Hospital ☐ (2) Urban health center ☐(3) Private hospital/clinic ☐ (4)others…….. (42) How much did it cost (in Kyat)? ……			

Part II Enabling Factors

Accessibility and Availability

(43) Where do you usually go for immunization?

☐ (i) Urban health center, ☐ (ii) Hospital, ☐ (iii) Private clinic/hospital,

☐ (iv) Other……

(44) What is the distance between your house and the immunization place?

……..…. Kilometer

(45) How do you go to the immunization place?

☐ (i) Walk, ☐ (ii) Motorbike, ☐ (iii) Bicycle/ trishaw,

☐ (iv) other……

(46) How long does it take to reach to the immunization place?

……..……..minutes

(47) How much does it cost for transport?

…… Kyats

(48) Do you receive vaccination with free of charge?

☐ (i) Yes, ☐ (ii) No, if (no) How much?..... Kyats

(49) How long does it take to receive immunization in the center?

…….. Minutes

Utilization of health service

(50) How many times did the mother receive ANC during pregnancy?

…….. times

(51) Where did the child is delivered?

☐ (i) Government Hospital/health center, ☐ (ii) At Home ☐ (iii) Private clinic/hospital, ☐ (iv) other…….

(52) Who performed the delivery?

☐ (i) Doctor, ☐ (ii) Midwife or nurses, ☐ (iii) Birth Attendant,

☐ (iv)other……

(53) Did health staff give the information about immunization after delivery?

☐ (i) Yes, ☐ (ii) No, ☐ iii) Not sure

Part III Reinforcing factors

Health volunteer, Community& health staffs and Family support, receiving immunization information

(54) Do you receive information about immunization?

☐ (i) Yes, ☐ (ii) No

(55) If yes, where do you receive the information from?

☐ (i) Health worker , ☐ (ii) Volunteer , ☐ (iii) Neighbours,

☐ (iv) others……

(56) When do you usually receive the information about immunization?

☐ (i) one week before ☐ (ii) 3 days before, ☐ (iii) 2 days before,

☐ (iv) other……

(57) Did you have good health service and care when you went for immunization?

☐ (i)Yes, ☐ (ii) No, ☐ (iii) Not sure

(58) Did you receive any support or advice from family and neighbor for the child immunization?

☐ (i)Yes, ☐ (ii) No, ☐ (iii) Not sure

Part IV, Immunization Status

(59) Do you have immunization card?

☐ (i) Yes (go to table.1) , ☐ (ii) No (counter check by health facility record)

Table (1)

No	**Type of vaccination**	**Yes / timeliness**		**No**
		Yes	Timeliness(+/-)	
(60)	BCG (birth to 2 months)			
(61)	Pentavalent 1st dose (at 2months)			
(62)	Pentavalent 2nd dose (at 4months)			
(63)	Pentavalent 3rd dose (at 6months)			
(64)	Polio oral 1st dose (at 2 months)			
(65)	Polio oral 2nd dose (at 4 months)			
(66)	Polio oral 3rd dose (at 6 months)			
(67)	Polio injection (at 4 months)			
(68)	Measles 1st dose (at 9 months)			
(69)	Measles 2nd dose (at 18 months)			
(70)	Fully immunized			
(71)	Partially immunized			
(72)	Not immunized at all			

(73) Reasons if the child is not fully immunized,

……

APPENDIX B
QUESTIONNAIRE IN MYANMAR

သုတေသန မေးခွန်းလွှာ

အမှတ်စဉ် .....

ရက်စွဲ ။ ။ .....

အပိုင်း (၁)

လူနေမှုအခြေနေဆိုင်ရာ အချက်လက်များ

၁။ ကလေးစောင့်ရှောက်သူ ☐ (၁) ကျား ☐ (၂) မ

၂။ ကလေးစောင့်ရှောက်သူ၏ အသက် ..... နှစ်

၃။ ကလေး၏ အသက် ..... နှစ်.....လ

၄။ ကလေးနှင့် ကလေးစောင့်ရှောက်သူ တော်စပ်ပုံ

☐ (၁) အမိ ☐ (၂) အဖ☐ (၃) ဖိုးဖွား ☐(၄) အခြား .....

၅။ သင် ကိုးကွယ်သည့်ဘာသာ

☐(၁) ဗုဒ္ဓဘာသာ ☐ (၂) ခရစ်စရန် ☐(၃)ဟာ့ ☐(၄)မူစလင် ☐ (၅) အခြား.....

၆။ သင့် ပညာအရည်အချင်း

☐ (၁) စာမတတ် ☐ (၂) မူလတန်း ☐(၃)အလယ်တန်း

☐ (၄)အထက်တန်း ☐ (၅) တကသိုလ် နှင့်အထက်

၇။ သင့်လက်ရှိ အလုပ်အကိုင်

☐ (၁) ကိုယ်ပိုင်လုပ်ငန်း ☐ (၂) နေ့စား ☐ (၃) အိမ်ထောင်ရှင်မ

☐ (၄)အစိုးရဝန်ထမ်း ☐ (၅) အခြား

၈။ သင့်မိသားစု၏ တလပျမ်းမျှဝင်ငွေ ..... ကျပ်

၉။ သင့်မိသားစု ဒီမှာနေထိုင်တာ ဘယ်လောက်ကြာခဲ့ပြီလဲ .....နှစ်

၁၀။ သင့်မိသားစုတွင် ကလေးဘယ်နဦးရှိပါသလဲ .....ယောက်

၁၁။ ဒီကလေး ကမွေးစဉ် ဘယ်နှစ်ယောက်မြောက်ပါလဲ .....

(က) ပုံမှန် ကာကွယ်ဆေးထိုးခြင်း ဆိုင်ရာ အသိပညာ ဗဟုသုတဆိုင်ရာမေးခွန်းများ

စဉ်	မေးခွန်းများ	မှန်	မှား	မသိပါ
၁၂။	ကလေးကာကွယ်ဆေးဖြင့် ကာကွယ်နိုင်သော ရောဂါ ၈မျိုးမှာ (၁)တီဘီ (၂)ဆုံဆို့ (၃) ကြောက်ညာ (၄)မေးခိုင် (၅)ဝက်သက် (၆)ပိုလီယို(၇)အသည်းရောင်အသား၀ါဘီ (၈)ဦးနှောက်အမြှေးရောင်			
၁၃။	ပထမအကြိမ်ပိုလီယိုကာကွယ်ဆေးကိုကလေးမွေးစတွင် တိုက်သည်။			
၁၄။	သင့်ကလေး ငါးမျိုးစပ် ကာကွယ်ဆေးကို သုံးကြိမ်ရရှိရန် လိုအပ်သည်။			
၁၅။	ဝက်သက်ရောဂါကို ရောဂါပိုးရှိသော လေရှူရှိုက်ခြင်းမှ တဆင့် ကူးစက်နိုင်သည်။			
၁၆။	အချို့ကလေးများတွင်ကာကွယ်ဆေးဘေးထွက်			

	ဆိုးကျိုးအနေဖြင့်သာမန်ဖျားနာခြင်းများ ဖြစ်တတ်သည်။			
၁၇။	မေးခိုင်ရောဂါ လကဏ္ဍာများမှာ မေးရိုး၊ လည်ပင်း၊ ကျောနှင့်ခန္ဓာကိုယ်တစ်ခုလုံးတောင့်တင်းခြင်းများဖြစ်သည်။			
၁၈။	အသည်းရောင်အသားဝါ(ဘီ)ပိုးသည် လူတစ်ဦးမှတစ်ဦးနာချေခြင်း၊ ချောင်းဆိုးခြင်းဖြင့် ကူးစက်နိုင်သည်။			
၁၉။	ကလေးငယ်ကြောက်ညာချောင်းဆိုးရောဂါဖြစ်လျှင်လျင်မြန်စွာချောင်းဆိုးပြီးကြောက်တွန်သံကဲ့သို့အသံရှည်ဖြစ်ပေါ်မည်။			
၂၀။	ဆုံဆို့ရောဂါကိုရောဂါပိုးပါသောအစားအစာစားသုံးခြင်းဖြင့် ကူးစက်နိုင်သည်။			
၂၁။	ဝက်သက်ရောဂါ၏နောက်ဆက်တွဲအနေဖြင့်ဝမ်းပျက်ဝမ်းလျှ နှင့် ပြင်းထန်နမိုးနီးယား ဖြစ်ပွားနိုင်သည်။			
၂၂။	ပိုလီယိုရောဂါဖြစ်ပွားလျှင်ပျောက်ကင်းအောင်မကုသနိုင်ကာကွယ်ဆေးဖြင့်သာ ကာကွယ်နိုင်သည်။			

(ခ) ပုံမှန်ကာကွယ်ဆေးထိုးခြင်း နှင့်ပတ်သက်သော ယူဆချက်များ ဆိုင်ရာမေးခွန်းများ

(SA လုံးဝသဘောတူသည် ။ A သဘောတူသည်။ N မသေချာပါ။ D သဘောမတူပါ။ SD လုံးဝသဘောမတူပါ)

စဉ်	မေးခွန်းများ	SA	A	N	D	SD
ရောဂါဖြစ်နိုင်ခြင်းဆိုင်ရာယူဆချက်များ						
၂၃။	သင့်ကလေးကျန်းမာနေသည့်တိုင် ကာကွယ်ဆေးထိုးပေးရန် မရှိမဖြစ်လိုအပ်သည်။					
၂၄။	ကလေးငယ်များ(၅နှစ်အောက်)သည် ရောဂါဖြစ်ပွားလွယ်သည်။					
၂၅။	ဒီအရပ်တွင် နေထိုင်သူ တစ်ဦး ဝက်သက်ရောဂါဖြစ်ပွားပါက သင့်ကလေးသို့ရောဂါကူးစက်နိုင်သည်။					
ရောဂါပြင်းထန်မှုဆိုင်ရာယူဆချက်များ						
၂၆။	ပိုလီယိုရောဂါဖြစ်ပွားပါက အမြဲတမ်း အင်္ကြောသေခြင်းမှ အသက်သေဆုံးခြင်းထိ အချို့လူနာများတွင်ဖြစ်ပေါ်နိုင်သည်။					
၂၇။	မေးခိုင်ရောဂါကို လွယ်ကူစွာကုသနိုင်သည်။					
၂၈။	တီဘီရောဂါသည် လွန်စွာ အန္တရာယ်ရှိသော ရောဂါမဟုတ် ၊ တီဘီ လူနာကလေးကို					

	တွေ့ခြင်းသည် သာမန်ဖြစ်စဉ်သာ ဖြစ်သည်။					
ကောင်းကျိုးရလာဒ်ဆိုင်ရာယူဆချက်များ						
၂၉။	ကလေးသည် ကာကွယ်ဆေး အားလုံးပြည့်မှီစွာ ရရှိပါက တစ်သက်တာ ရောဂါကိုယ်ခံနိုင်စွမ်း နှင့် ကျန်းမာသော ဘဝကိုရရှိနိုင်မည်။					
၃၀။	ကလေး ကာကွယ်ဆေးပြည့်မှီစွာ မရရှိပါက သဘာဝ အလျောက် ရောဂါများမှ မကာကွယ်နိုင်ပါ။					
၃၁။	ကာကွယ်ဆေးသည် သင့်ကလေးကို အန္တရာယ် နှင့် ဆိုးဝါးသော ဘေးထွက်ဆိုးကျိုးကိုဖြစ်ပေါ်စေသည်။					
အတားအဆီးများဆိုင်ရာယူဆချက်များ						
၃၂။	သင်အလုပ်များနေလျှင် သင့်ကလေးကာကွယ်ဆေးထိုးမှုကို နောက်သို့အချိန်ရွှေ့ဆိုင်းနိုင်သည်။					
၃၃။	သင့်ကလေး ကာကွယ်ဆေးထိုးရန် ဆေးထိုးနေရာတွင် အချိန်အတော်ကြာ စောင့်ပေးရသည်။					
၃၄။	ကလေး ကာကွယ်ဆေးထိုး နေရာသို့သွားရန် ခရီးစရိတ် ကုန်ကျမှုအတွက် အခက်အခဲရှိသည်။					

အခြား ကာကွယ်ဆေးထိုးခြင်းဖြင့် ကာကွယ်နိုင်သော ရောဂါများဆိုင်ရာ အသိပညာ ဗဟုသုတ နှင့် ဆောင်ရွက်ချက်များ အတွက်မေးခွန်းများ

စဉ်	မေးခွန်းများ	မှန်	မှား	မသိပါ
၃၅။	ဂျပန်ဦးနှောက်ရောင် ကာကွယ်ဆေးကို သင်ကြားဖူးပါသလား။			
၃၆။	ရိုတာ ဗိုင်းရပ်(စ်) ကာကွယ်ဆေးကို သင်ကြားဖူးပါသလား။			
၃၇။	အသည်းရောင် အသားဝါ ဘီ ကာကွယ်ဆေးကိုသင်ကြားဖူးပါသလား။			
၃၈။	သင့်ကလေး ရိုတာ ဗိုင်းရပ်(စ်) ပိုးကူးစက်လျှင် ဖျားနာခြင်း ၊ အန်ခြင်း နှင့် ဝမ်းပျက်ဝမ်းလျှောခြင်းများဖြစ်မည်။			
၃၉။	သင့်ပတ်ဝန်းကျင်တွင် အောက်ဖော်ပြပါ ရောဂါများနှင့် ကလေးများကို တွေ့ဖူးပါသလား ☐ (၁) ဂျပန်ဦးနှောက်ရောင် ☐ (၂) ရိုတာ ဗိုင်းရပ်(စ်) ကြောင့် ဝမ်းပျက်ဝမ်းလျှောခြင်း ☐ (၃) အသည်းရောင် အသားဝါ ဘီရောဂါ			
၄၀။	သင့်ကလေးကို အောက်ဖော်ပြပါ ရောဂါကာကွယ်ဆေးများ ထိုးပေးဖူးပါသလား			

	☐ (၁) ဂျပန်ဦးနှောက်ရောင် ကာကွယ်ဆေး ☐ (၂) ရိုတာ ဗိုင်းရပ်(စ်) ကာကွယ်ဆေး ☐ (၃) အသည်းရောင် အသားဝါ ဘီရောဂါ ကာကွယ်ဆေး			
၄၁။	ထိုးပေးဘူးလျှင် မည်သည့် နေရာ တွင်ထိုးခဲ့ပါသလဲ။ ☐ (၁) အစိုးရဆေးရုံ ☐(၂) အစိုးရကျန်းမာရေးဌာန ☐ (၃) ပုဂလိကဆေးရုံ ၊ဆေးခန်း ☐(၄)အခြား			
၄၂။	ကာကွယ်ဆေးထိုးမှု အတွက် မည်မျှကုန်ကျခဲ့ပါသလဲ ..... ကျပ်			

<u>အပိုင်း (၂)</u>

ကာကွယ်ဆေးအသုံးပြုမှု ရရှိနိုင်ရန် လက်လှမ်းမှီရန် အထောက်အပံ့ပေးခြင်းဆိုင်ရာ အချက်အလက်များ

၄၃။ သင့်ကလေး ပုံမှန် ကာကွယ်ဆေးထိုးခြင်း အတွက် အများသောအားဖြင့် မည်သည့် နေရာသို့ သွားလေ့ ရှိပါသလဲ။

☐(၁) အစိုးရကျန်းမာရေးဌာန ☐ (၂) အစိုးရဆေးရုံ☐ (၃)ပုဂ¾လိကဆေးရုံ ၊ဆေးခန်း ☐ (၄)အခြား.....

၄၄။ သင့်နေအိမ်မှ ထို ကာကွယ်ဆေးထိုးနေရာသို့ မည်မျှကြာဝေးသနည်း။

..... ကီလိုမီတာ

၄၅။ ထိုကာကွယ်ဆေးထိုးနေရာသို့ သင်ဘယ်လိုသွားပါသလဲ။

☐(၁)လမ်းလျှောက် ☐ (၂)ဆိုင်ကယ်ဖြင့် ☐ (၃) စက်ဘီး၊ဆိုက်ကား

☐(၄)အခြား.....

၄၆။ ထိုကာကွယ်ဆေးထိုးနေရာသို့ရောက်ရှိရန် အချိန်ဘယ်လောက်ကြာပါသလဲ

.....မိနစ်

၄၇။ ထိုကာကွယ်ဆေးထိုးနေရာသို့သွားရန် ခရီးစရိတ် မည်မျှကုန်ကျပါသလဲ

.....ကျပ်

၄၈။ အခမဲ့ ကာကွယ်ဆေးထိုးမှု ရရှိပါသလား

☐ (၁) ရရှိပါသည် ☐(၂)မရပါ

ကုန်ကျငွေ.....ကျပ်

၄၉။ ကာကွယ်ဆေးထိုးမှု ရရှိရန် အချိန်ဘယ်လောက်ကြာပါသလဲ .....မိနစ်

ကျန်းမာရေး ဝန်ဆောင်မှု အသုံးပြုခြင်းဆိုင်ရာ အချက်အလက်များ

၅၀။ ကလေး၏ မိခင်ကိုယ်ဝန်ဆောင်စဉ် ကိုယ်ဝန်ဆောင်စောင့်ရှောက်မှု

အကြိမ်မည်မျှယူခဲ့ပါသလဲ။.....ကြိမ်

၅၁။ ကလေးကို မည်သည့်နေရာမှာမွေးဖွားခဲ့ပါသလဲ။

☐ (၁) အစိုးရဆေးရုံ၊ ဆေးခန်း ☐ (၂)အိမ် ☐ (၃) ပုဂ္ဂလိကဆေးရုံ

၊ဆေးခန်း ☐ (၄)အခြား.....

၅၂။ ကလေးကို မည်သူမွေးဖွားပေးခဲ့ပါသလဲ

☐ (၁) ဆရာဝန် ☐(၂)သားဖွားဆရာမ၊ သူနာပြု ☐ (၃)လက်သည်

☐ (၄)အခြား.....

၅၃။ မွေးဖွားပြီးနောက် ကျန်းမာရေးဝန်ထမ်းများထံမှ
ကာကွယ်ဆေးထိုးခြင်းနှင့် ပတ်သက်သော
သင်တန်းအချက်အလက်မျိုးရှိခဲ့ပါသလား☐

(၁) ရရှိပါတယ် (၂)မရပါ (၃)မသေချာပါ

အပိုင်း (၃)

ကလေးကာကွယ်ဆေးအသုံးပြုမှုအတွက် ထောက်ပံ့ စေ့ဆော်မှုများဆိုင်ရာ အချက်အလက်များ၊

၅၄။ ကာကွယ်ဆေးထိုးခြင်းနှင့် ပတ်သက်သော သတင်းအချက်အလက်များ ရရှိလေ့ရှိပါသလား။

☐ (၁)ရရှိပါသည် ☐(၂)မရရှိပါ

၅၅။ ရရှိလျှင် မည်သူ့ထံမှ ရပါသလဲ။

☐ (၁)ကျန်းမာရေး ဝန်ထမ်း ☐ (၂)ကျန်းမာရေးစေတနာ့ဝန်ထမ်း

☐ (၃)အိမ်နီးနားချင်း ☐ (၄)အခြား.....

၅၆။ကာကွယ်ဆေးထိုးခြင်းသတင်းအချက်အလက်များကိုမည်သည့်အချိန်မှာရရှိပါသလဲ။

☐ (၁) တစ်ပတ် အလို ☐ (၂) ၃ရက်အလို ☐ (၃) ၂ရက်အလို☐

(၄)အခြား.....

၅၇။ကာကွယ်ဆေးထိုးသွားသောအခါကောင်းမွန်သောကျန်းမာရေးစောင့်ရှောက်မှုများ ရရှိခဲ့ပါသလား။ ☐(၁)ရရှိပါသည် ☐ (၂)မရရှိပါ ☐(၃)မသေချာပါ

၅၈။ သင့်မိသားစု နှင့် သင့်ပတ်ဝန်းကျင် (မိတ်ဆွေ၊ အိမ်နီးနားချင်း) များထံမှ ကာကွယ်ဆေးထိုးခြင်းနှင့်ပတ်သက်သောအထောက်အပံ့အကြံအညာဏ်များရရှိပါသလား။

☐ (၁) ရရှိပါသည် ☐ (၂)မရရှိပါ ☐ (၃)မသေချာပါ

အပိုင်း (၄)

ကာကွယ်ဆေးအသုံးပြုမှု ဆိုင်ရာ အချက်လက်များ

၅၉။ သင့်တွင် ပုံမှန်ကလေးကာကွယ်ဆေးထိုးမှတ်တမ်း (ကဒ်) ရှိပါသလား။

☐ (၁)ရှိပါသည် (ဇယား အမှတ် ၁သို့) ☐ (၂)မရှိပါ

(ဆေးခန်းမှတ်တမ်းဖြင့်စစ်ဆေးရန်)

ဇယား အမှတ် (၁) (အမှန်ခြစ်ပါ - √)

စဉ်	ပုံမှန်ကာကွယ်ဆေး	ရရှိသည် ၊ အချိန်မှီ		မရရှိပါ
		ရရှိသည်	အချိန်မှီ (+/-)	
၆၀။	ဘီစီဂျီ - မွေးစ မှ ၂လ			
၆၁။	ငါးမျိုးစပ် (ပထမအကြိမ်) - ၂လ			
၆၂။	ငါးမျိုးစပ် (ဒုတိယအကြိမ်) - ၄လ			
၆၃။	ငါးမျိုးစပ် (တတိယအကြိမ်) - ၆လ			
၆၄။	ပိုလီယို (ပထမအကြိမ်) - ၂လ			
၆၅။	ပိုလီယို (ဒုတိယအကြိမ်) - ၄လ			
၆၆။	ပိုလီယို (တတိယအကြိမ်) - ၆လ			
၆၇။	ပိုလီယိုကာကွယ်ဆေး ထိုးဆေး - ၄လ			
၆၈။	ဝက်သက် ဂျိုက်သိုး - ၉လ			
၆၉။	ဝက်သက် (ဒုတိယအကြိမ်)- ၁ နှစ်ခွဲ			
၇၀။	အပြည့်အဝ ကာကွယ်ဆေးထိုးသည်			
၇၁။	တစ်စိတ်တစ်ပိုင်း ကာကွယ်ဆေးထိုးသည်			
၇၂။	လုံးဝကာကွယ်ဆေး မထိုးပါ			

၇၃။ သင့်ကလေး အပြည့်အဝ ကာကွယ်ဆေးမရခဲ့လျှင် မထိုးခဲ့ရသည့်
အကြောင်းအရင်း

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APPENDEX C

PERCENTAGE OF RESPONDENT'S KNOWLEDGE AND PERCEPTION TOWARDS IMMUNIZATION

Percentage of respondents' knowledge towards immunization (n= 429)

No	Knowledge of caregiver	Incorrect answer N (%)	Correct answer N (%)
1.	Eight diseases that can be preventable by childhood vaccination are (1) Tuberculosis, (2) Diphtheria, (3) Pertussis, (4) Tetanus, (5)Polio, (6)Hepatitis B, (7)Haemophilus influenza type B and (8)Measles	31 (7.2)	398 (92.8)
2.	Polio first dose is given at birth	216 (50.3)	213 (49.7)
3.	The child need to receive three doses of Pentavalent vaccine	64 (14.9)	365 (85.1)
4.	Measles can be transmitted by breathing of infectious air	154 (35.9)	275 (64.1)
5.	Some children may have mild fever as side effect of the immunization	11 (2.6)	418 (97.4)
6.	The symptoms of tetanus are spasm of the jaw, neck, back and the whole body.	169 (39.4)	260 (60.6)
7.	Hepatitis B can be transmitted to another person by sneezing or coughing	372 (86.7)	57 (13.3)
8.	If the child has Pertussis, he will have rapid cough followed by a high-pitched "whoop".	157 (36.6)	272 (63.4)

9.	Diphtheria can be transmitted by eating contaminated food including germs	394 (91.8)	35 (8.2)
10.	Pneumonia and diarrhea can happen as the complications of Measles.	80 (18.6)	349 (81.4)
11.	There is no cure for Polio infection, but can be prevented by vaccination	52 (12.1)	377 (87.9)

Percentage of respondents' perception towards immunization (n= 429)

SA= Strongly Agree, A= Agree, N= Neutral, D = Disagree, SD = Strongly Disagree

No	Respondent's Perception	SA N (%)	A N (%)	N N (%)	D N (%)	SD N (%)
	Susceptibility					
1.	It is necessary to immunize your children even though he is healthy.	366 (85.3)	55 (12.8)	4 (0.9)	4 (0.9)	0 (0)
2.	Young children (<5years) to vulnerable to diseases.	292 (68.1)	96 (22.4)	31 (7.2)	7 (1.6)	3 (0.7)
3.	If someone in the area is infected with Measles, your children can be transmitted the disease.	210 (49)	102 (23.8)	68 (15.9)	25 (5.8)	24 (5.6)
	Severity					
4.	Poliomyelitis can result in permanent paralysis to death in some cases.	209 (48.7)	102 (23.8)	89 (20.7)	21 (4.9)	8 (1.9)
5.	Tetanus can be easily treated.	113 (26.3)	98 (22.8)	127 (29.6)	39 (9.1)	52 (12.1)

6.	Tuberculosis is not very dangerous and it is normal when you see a child with tuberculosis in the area.	90 (21)	130 (30.3)	24 (5.6)	59 (13.8)	126 (29.4)
	Benefits					
7.	If a child is fully vaccinated, he will have a lifelong immunity and healthy life.	340 (79.3)	66 (15.4)	14 (3.3)	4 (0.9)	5 (1.2)
8.	A child cannot be protected from diseases by natural without complete immunization.	319 (74.4)	77 (17.9)	13 (3)	10 (2.3)	10 (2.3)
9.	Immunization can cause dangerous and severe side effects to the child.	15 (3.5)	16 (3.7)	22 (5.1)	98 (22.8)	278 (64.8)
	Barriers					
10.	I can postpone my child vaccination if I am busy	57 (13.3)	70 (16.3)	12 (2.8)	78 (18.2)	212 (49.4)
11.	It takes a long time to receive immunization in the vaccination post	121 (28.2)	143 (33.3)	23 (5.4)	85 (19.8)	57 (13.3)
12.	It is difficult to use money for transportation charges to go immunization place.	7 (1.6)	17 (4)	21 (4.9)	96 (22.4)	288 (67.1)

Percentage of respondents' knowledge and behavioral towards additional Vaccine Preventable Diseases (n= 429)

Have you ever heard of Japanese Encephalitis vaccine?	**Number**	**Percentage**
No, Not sure (Negative answer)	335	78.1
Yes (Positive answer)	94	21.9
Have you ever heard of Rotavirus vaccine?	**Number**	**Percentage**
No, Not sure (Negative answer)	376	87.6
Yes (Positive answer)	53	12.4
Have you ever heard of Hepatitis B vaccine?	**Number**	**Percentage**
No, Not sure (Negative answer)	31	7.2
Yes (Positive answer)	398	92.8
If the child had Rotavirus infection, he will suffer fever, vomiting and water diarrhea.	**Number**	**Percentage**
No, Not sure (Negative answer)	295	68.8
Yes (Positive answer)	134	13.2

APPENDEX C

ETHICAL APPROVAL DOCUMENT

Certificate of MUSSIRB Approval

★★★★★★★★★★★★

Certificate of Approval No.:	2017/052.0803
MUSSIRB No.:	2017/068 (B2)
Student ID:	5938598 ADPM/M
Title of Project:	FACTORS ASSOCIATED WITH UTILIZATION OF IMMUNIZATION SERVICE AMONG UNDER 3YEARS OLD CHILDREN IN URBAN SLUMS OF CHANMYATHAZI TOWNSHIP, MANDALAY, MYANMAR
Principal Investigator:	Miss Win Lae Lae
Major Advisor:	Lecturer Dr.Isareethika Jayasvasti
Name of Institution:	ASEAN Institute for Health Development
Approval Includes:	1) MUSSIRB Submission Form version received date 15 February 2017 2) Participant Information sheet version date 7 March 2017 3) Informed Consent Form version date 15 February 2017

The Committee for Research Ethics (Social Sciences) is in full compliance with International Guidelines of Human Research Protection such as Declaration of Helsinki, The Belmont Report, and CIOMS Guidelines.

Date of Approval: March 8, 2017
Date of Expiration: March 7, 2018

Chairman

(Emeritus Professor Dr.Santhat Sermsri)

Head of the Institute

(Assoc.Prof.Dr.Luechai Sri-Ngernyuang)
Dean of Faculty of Social Sciences and Humanities

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